Alberta
SUSTAINABLE RESOURCE
DEVELOPMENT

PERMANENT SAMPLE PLOT (PSP) FIELD PROCEDURES MANUAL

March 2005

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105-07609/

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1.0 INTRODUCTION

In order to manage our forest resource effectively, we need to acquire a better understanding of stand dynamics, i.e. how trees grow and stands change over time. An accurate method of determining growth and yield is through the use of permanent sample plots (PSPs). The growth of a stand can be estimated directly by taking measurements of the same trees at periodic intervals. This information is vital in the establishment of a sustained yield program.

The main objectives in permanent plot sampling are:

1. to assess stand dynamics such as succession, regeneration, ingrowth and mortality
2. to provide a data base that can be used to develop yield curves
3. to provide representative areas for study of management techniques

To meet these objectives, over 650 permanent sample plots (PSPs) have been established since 1960. More PSPs will be needed (over 3000 in total) in order to provide representative information for a variety of densities, heights, species, ages and site conditions.

1.1 Schedule of Remeasurements

Remeasurements of existing PSPs should take place at the same time of the year as the initial establishment. In order to monitor the stand dynamics of different types of stands, different remeasurement schedules are used. These schedules are as follows:

1. Every 5 years
    - for coniferous stands < 80 years old or > 130 years old.
    - for deciduous stands < 60 years old or > 100 years old

2. Every 10 years
    - for coniferous stands between 80 and 130 years old
    - for deciduous stands between 60 and 100 years old.

Determination of the remeasurement schedule is dependent upon the current age of the stand and not the age at the time of plot establishment. In mixedwood stands the age of the leading species will be used. If budget constraints are a concern, then coniferous plots over 50 years old could be put onto a 10-year cycle.

2.0 FIELD PROCEDURES

Prior to April 1981 an alternate procedure was used for establishing plots than the procedure described in Section 2.1. The difference between the methods is the plot layout. This can create confusion when remeasurements are done and for this reason a description of the plot layout prior to April 1981 is in Section 2.2.1.

2.1 Plot Establishment Procedures

The plot establishment procedures described in this section are for all plots established after April 1981.

2.1.1 Location of Plot Centre

The approximate location of the PSP should be pre-determined on a stand map. The selected stand must be large enough to ensure that the entire plot is within the desired cover type. After the preliminary map work is completed and a tie point (using a permanent land feature) has been selected, a pre-determined horizontal distance and azimuth is chosen to locate a potential plot centre and the ground plot centre is established. An aluminum tag, labelled with the PSP number and the word "CENTRE" (e.g. PSP456-CENTRE), is attached to the top of the post.

A tie-point is then established to link the plot centre to a permanent land feature on a Phase 3/AVI map for the purpose of locating the plot for future remeasurements. Section 2.2.2 deals with maintenance and establishment of tie-points. The tie-point information is then used to locate the plot on the aerial photographs and the forest cover type map. For tallying purposes, the legal land description is recorded as the section and legal subdivision containing the centre of the PSP group.

The following plot establishment sequence is used to establish a PSP with a plot size of 1/10 hectare. Plot centres are Gpsed at least twice. Second time is to verify that the first GPS location is ±-3m.

2.1.2 Plot Establishment Sequence

The plot establishment sequence must be followed closely to orient the plot properly and to produce the nested sampling design. All posts and metal pins, for the regeneration and sampling plot corners, are to be tagged and labelled as shown in Figure 2.1.

To establish a one-tenth hectare plot, as shown in Figure 2.2, the following sequence is used.

1. Using a staff compass go on a bearing of 45 degree for 22.36 m, from the centrepost and locate the NE corner of the tree plot. Pound a post into the ground at this point and attach a tag with the PSP number and "NE" corner marked on it (e.g. PSP# 456-NE). An aluminum angle post are also placed into the ground at each corner post. It is pounded in the ground until at least 10cm remains above ground.

   Note: The centre metal post must be removed before the staff compass is used.

2. In the same manner locate the other 3 tree plot corners using the following bearings:

   SE Corner - 135°
   SW Corner - 225°
   NW Corner - 315°

If possible, check the alignment of the plot (ie. a square with right angle corners) by standing at one corner and sighting through the centre to the opposite corner. The tree posts, NE, CENTRE and SW should form a straight line. If the posts do not line up they must be located until they do.

> **Note:** All distances are horizontal distances (if slopes are ≥ 10% the distance must be corrected – use the slopes correction factor tables in Appendix 4.5).

3. The length of each side is measured using a 50 m tape and must be 31.62 m ± 0.25m (31.37 m – 31.87m). Relocation of the corner posts is necessary if the length of a side falls outside this range. Record the distance of each side and each diagonal on the Plot Maintenance Report Figure 2.10. The tree plot boundaries and azimuth are determined by running string between corner posts. Care must be taken with borderline trees. A tree is considered "in" if more than half of the stem, at breast height, falls inside the plot.

4. A sapling/regeneration plot (1/16 the size of the plot) must be established even if there are no saplings or regeneration present. To establish the sapling/regen plot, place an aluminum angle post 11.18m, at an azimuth of 315°, from the plot centre. This marks the SE corner. The NE and SW corners of the sapling/regen plot are located by running lines north and west, respectively, from the SE corner to the tree plot boundary. Check the lengths of the plot to ensure that they are 7.9m ± 0.06m (7.84m – 7.96m). Attach a tag labeled with the PSP number, "SAP/REGEN, and the corner (e.g. PSP456-SAP/REGEN-SE). The sapling/regen plot boundaries are defined with string to determine "in" and "out" stems.

5. The reservation boundary (buffer) is established by running a line, using a topofil, for 100m at 360° from plot center. Using blue paint, mark the trees, at 5m to 10m intervals, for 200m in each of the cardinal directions creating a square shaped buffer surrounding the plot. Paint a small rectangle 22cm x 28cm, one –third of the circumference, on each tree, at eye level (2m above ground) facing away from the plot. To aid in the relocation of the buffer corners, paint every tree for the first 10m and the last 10m on each side of the buffer. The trees used for buffer corners should have "C"s painted on the two sides facing out from the plot. Also paint NW to indicate Northwest corner of buffer NE to indicate Northeast corner of buffer, etc. Avoid if possible painting dead trees, wind-blown trees and trees with thick, low-hanging branches. When remeasuring the plot, PSP blue tags (and/or Blue PSP flagging tied to the trees) are stapled above the blue painted trees. Repaint the blue trees and put blue tags on every 2nd blue painted tree. Buffer is GPSed for mapping and GIS applications.

6. To assist in the future location and remeasurement of the plot, trees (called a witness trees), outside of the tree plot, at each tree plot corner is painted blue, on the side that faces in towards the plot centre.

In Summary:

Table 1

Tree Plot				Sapling/Regen Plot			Buffer	
Area (ha)	Area (m^2)	Side (m)	Diagonal (m)	Area (m)	Side (m)	Diagonal (m)	Area (m^2)	Side (m)
0.10	1,000	31.62	44.72	62	7.90	11.18	40,000	200.0
0.15	1,500	38.73	54.77	94	9.69	13.70	56,250	237.0
0.20	2,000	44.72	63.24	125	11.18	15.81	90,000	300 0

2.1.3 Plot Assessment at Establishment

Plot assessment refers to plot data related to the physical characteristics of that area. Plot assessment is collected in the following categories using the given descriptions.

2.1.3.1 Plot Overstorey/ Understorey Covertypes

There are two kinds of plot covertypes recorded. The AVI Photo-Interpreted Overstorey and Understorey species codes are recorded only at plot establishment after all field work and mapping has been completed. The AVI Field Overstorey and AVI Understorey species codes are recorded in the shaded columns by field crews during plot establishment and remeasurement. The codes used for covertypes are listed in Section 2.1.4. The variables location, slope, aspect, elevation and soils information are only recorded at plot establishment.

2.1.3.2 Topography and Elevation

Location
Location refers to the relative topographic position of the plot, in a hydrological sense, when compared to the general immediate area surrounding the plot. The codes used for location (see Appendix 2a) are:

1-Hollow
2-Flat
3-Slope
4-Hilltop

Slope
With the use of clinometer the average slope for the plot is recorded to the nearest %. If theres is no slope, zero is recorded.

Aspect
Average aspect (the direction when facing away from the slope) of the plot recorded as N, NE, E, SE, S, SW, W, or N. (Note: if slope percent is zero, make note in comments section).

Elevation
Elevation is recorded as the height above the sea level to the nearest metre and is taken at the PSP group/plot centre. The contour line closest to the plot location on a National Topographic System (NTS) map is recorded in the comments section on the PSP Header Sheet to act as a guide for field elevation reading. In order to obtain an accurate reading, the altimeter must be set daily at a location with a known elevation (e.g. airstrip, benchmark, etc.) This elevation is recorded (Reading 1) in the comments section on the header sheet. Upon entering the PSP, the elevation is read and recorded (Reading 2) in the columns 77 – 80 allocated in the header and may be subject to change. The altimeter is read (Reading 3) once again at the location with the known elevation. The average difference between Reading 3 and Reading 1 is added to Reading 2 to obtain the final elevation of the plot. If the final calculated elevation differs from the field reading (Reading 2), the Header sheet must have the elevation record changed.

e.g. First reading at known elevation = 1000m (Reading 1)
PSP elevation = 1500m (Reading 2)
Final Reading at know elevation = 980m (Reading 3)

$$\frac{\text{Reading 3} - \text{Reading 1}}{2} + \text{Reading 2} = \text{Final PSP elevation}$$

$$\begin{aligned}\frac{980\text{m} - 1000\text{m}}{2} + 1500\text{ m} &= -10\text{m} + 1500\text{m} \\ &= 1490\text{m (final calculated elevation)}\end{aligned}$$

Reading 2 is not to be changed if Reading 3 is drastically different from Reading 1 due to changes in barometric pressure (e.g. a storm front has come through since Reading 1 was set).

2.1.3.3 Soils

Erosion Potential

This describes the chance of water eroding down to or into the mineral soil layer. This is a based upon water flow, slope, and soil type. The codes used for erosion potential (see Appendix 3a) are:

1 – Slight
2 – Moderate
3 – High

Drainage

Soil drainage is assessed by evaluating the plot position, soil texture, humus depth, location of the water table, permeability and water storage capacity. The codes used for soil drainage (see Appendix 3b) are:

1 – Very rapidly drained
2 – Rapidly drained
3 – Well drained
4 – Moderately well drained
5 – Imperfectly drained
6 – Poorly Drained
7 – Very poorly drained

Depth of Mineral Soil

The average depth of the duff layer (organic matter) to the mineral soil (or the water table in boggy conditions) is recorded to the nearest centimetre.

2.1.3.4 Surface Vegetation

Type

There are nine possible types or combinations of grass, lichen/moss, herbs (flowers and non-woody stems) and shrubs (woody stems). The dominant vegetation type is recorded.

1 – Grass
2 – Grass and herbs
3 – Grass and shrubs
4 – Lichen/moss
5 – Lichen/moss and herbs
6 – Lichen/moss and shurbs
7 – Herbs
8 – Herbs and shrubs
9 – Shrubs

Ground Cover

The percent of the ground that is covered by surface vegetation is recorded to the nearest percent. In most cases this will be, or very close to, 100%. Plots with a lot of surface rock, woody material or water will have a lower percent of ground cover. A comment why cover is not 100% must be made on the comments section of the header sheet.

2.1.3.5 Plot Maintenance Report

The maintenance report data is recorded on both plot established and plot remeasurement. Refer to Section 2.2.3.1 for information on access, plot damage and buffer damage.

2.1.4 Tree Plot Measurement

All standing trees (live and dead) ≥ 9.1 cm DBH (diameter at breast height) within the tree plot are tagged, measure, and tallied. Any standing dead trees must be capable of withstanding a firm push before being measured (standing dead trees are tagged at establishment to assist in plot remeasurement and for possible use in growth modeling).

If for some reason this 1/16 sapling/regen plot is not representative of the plot, a note must be made in the comments section indicating this is the case but sapling are still tagged and measured.

2.1.4.1 Species Code – see Master Appendix 12

2.1.4.2 Tree Measurement

In order to aid in the tally of the trees within the tree plot, the plot is divided into four north-south strips, called swaths. Each swath is approximately ¼ the width of the plot, runs the length of the plot and is defined with strings as shown in Figure 2.3. Swaths are marked with topophil string as shown in Figure 2.3, Swaths are marked with topophil string and/or yellow geo flagging.

All talliable trees are tagged (numbered from 1 to 9997) starting with the tree closest to the NW corner post. Trees are numbered consecutively from side to side within each swath in a forward direction. Tags on the trees tallied in the southern direction are tagged on the south side of the tree (see Figure 2.3). By tagging trees in this manner, remeasurement is simplified and plots are easier to locate as tags can be seen when entering the plot from any direction.

Tags are nailed to the tree/saplings at exactly breast height (see Section 2.1.4.3) using 6.5 cm (2.1/2 inch) spiral nails. Nails must have the head sloped slightly downwards and pounded until 2.5 – 3.5 cm remain outside of the tree. This will keep the tags secure and not grown over by the tree. The tree numbers are to be written vertically on the tree tags (see Figure 2.3 B). Wire is to be used on deciduous trees because they do not take nails well. Leave lots of room.

2.1.4.3 Diameter at Breast Height (DBH)

Breast height is 1.3 metres from the point of germination as shown in Figure 2.4. A blue bar is painted at DBH also.

Breast height is determined using a straight stick 1.3m long. Using a metal diameter tape, measure the tree's diameter to the nearest 0.1 cm making sure the tape is perpendicular to the stem. Diameters are always taken directly above the nail unless there are large branches or swelling right at breast height. These defects are to be avoided and the diameter is taken immediately above or below the distortion and a comment noting the problem is made. Also see appendix #14 for determining breast height. An example on the tally sheet is the comments section (e.g. DBH taken below swell). See Figure 2.14, tree#1.

2.1.4.4 Height

With the advent of electronic height measuring devices it was decided that in 1998, the heights of all trees (alive) will be taken. Height to top live branches on trees that have damaged tops.

All height trees are to be marked at breast height with any colour of geo-flagging tape. As well a blue painted dot facing the direction in which the cruiser went in order to complete the height measurement shall be put on each height tree. The dot should be no longer than 5 cm in diameter and must be located between .75m – 10 from the ground. Do not measure the height of standing dead trees even if it was a sample tree last remeasurement. Do not measure height on dead and down trees. See Master Appendix for tree height measurement methodology.

For office purposes and a method of checking field calculations record the tree number, species, top %, top % to live crown, and bottom % readings, (slope distance and slope % when applicable) on the back of the tally sheet (see Figure 4.2A). To be done if measuring with clinometer and loggers tape. If heights taken with an electronic height finder, record person and type of machine on back of tally sheet. The space allocated for correction is used when a bottom percentage reading cannot be taken for the base of the tree and a known height (ie. DBH) or measured height must be used (this correction must be added to the calculated height to get total height). In addition, the calculated net percentage, horizontal distance, and total height should be recorded for each tree. The calculated heights are to be transferred onto the front of the tally sheet in the appropriate columns.

2.1.4.5 Height to Live Crown

The height from the ground to the base of the live crown (see Figure 2.5) is measured on all trees that have been measured for total height. The base of the live crown is the point that separates the continuously branched portion of the tree and the part that has sporadic or no branching. Live crowns on deciduous species start at the leaves, not at the branches. Live crowns on coniferous species start at the tip of the live branch, not at the base of the branch. The height to live crown is quite variable depending on stand maturity and density with young, open stands having low live crowns and mature, stocked stands having higher, live crowns. Height to live crown is measured on age trees when they are on the ground and being prepared for sectioning.

2.1.4.6 Crown Class

Crown class (CC) refers to the position of an individual tree within the canopy of the stand inside the plot. Crown class is assessed on a plot-by-plot basis, not on the stand as a whole. For example, an intermediate tree in one PSP plot may be codominant in the next. The following figure shows the types of crown class in a single layer stand. Crown classes are recorded for all tress with the exception of those with a broken top/system, are dead, cut down, missing, or have a severe lean (see Figure 2.6).

2.1.4.7 Age

The age of a PSP is determined by felling and sectioning a minimum of three codominant/dominant trees of each major species found within the plot. The selected trees are found outside the plot inside the reservation boundary (buffer) and the same stand types as the plot. When selecting trees for sectioning, preference should be given to healthy trees. Trees are sectioned in accordance with the Public Lands and Forests Division Tree Sectioning Procedure Manual and tallied on the Tree Sectioning Tally Sheet (CSTM 04 or CSTM 04A). Information pertaining to species, DBH, height, height to live crown, crown class, and condition codes are transferred onto the PSP Header Sheet under tree number 0000. For each sectioned tree the DBH age, stump age, and stump increments for 0 –10 years and 10 – 20 years are also recorded. See Figure 2.7.

Refer to Section 4.11 for special measurements for immature and mistletoe plots.

The three stump ages for each species must be within a ten-year frame of each other or more trees must be felled (i.e. 90-100-110 represents a 20 year gap – need to fall 1 more tree with an age between 90-100 or 100-110; 96-99-104 represents an 8 year gap – no more trees need to be felled). The cookies should be marked with the plot number and tree number, then taken back to the field office for verification. Care must be taken with aging as some species, such as aspen, can have false rings that may result in inaccurate age counts. This would affect growth and yield calculations. Approximate locations of sectioned trees shall be indicated with an "X" on the maintenance report. As well, yellow geo-flagging shall be used to indicate the field locations.

2.1.4.8 Stem Mapping

All tagged stems within the tree sapling plot are stem mapped. Stem mapping is used to identify the position of each tree or sapling with respect to other surrounding trees or sapling and can be used in distance dependent growth models and is used in plot remeasurement to locate missing trees or sapling.

A staff compass and a metric tape is used to determine the azimuth and distance to the centre of each tree or sapling, at breast height, from the plot centre. Azimuth are recorded from 1°-360° and distances are measured to the nearest 0.1 m. Standing dead trees are to be stem mapped.

Regeneration are not stem mapped.

2.1.5 Sapling/Regen Plot Measurement

Sapling/Regeneration History

1968

During re-measurements in 1968, saplings were measured and recorded for the first time. Saplings were considered to be all stems inside the tree plot with a diameter at breast height (DBH) of 0.1 – 0.6 inches. However, saplings were not measured in every PSP or even in every subplot of a PSP. When saplings were tallied, they were termed "regeneration".

Regeneration has been tallied by height class and species since 1960. All regeneration within a subplot were counted until 1981.

1981

Sapling plot sizes are required to be ¼ the size of the tree plot while regeneration plot sizes are 1/16 of the tree plot. The 900 series drainage plots and 700 series immature plots are also exceptions. These dimensions are used for all subplots for field measurements unless there are over 100 saplings in the sapling plot. When this occurs the sapling plot is reduced to the regeneration plot. (See table on plot sizes)

PLOT SIZES

Year of establishment	TREE PLOT			SAPLING PLOT		REGENERATION PLOT	
	Area (ac.)	(m^2)	Length of Side (m)	Area (m^2)	Length of Side (m)	Area (m^2)	Length of Side (m)
1960-1981	1/20	202	14.23	50	7.11	13	3.56
	1/10	405	20.12	101	10.06	25	5.03
	1/8	506	22.49	126	11.25	32	5.62
	1/5	809	28.45	202	14.23	50	7.11
	1/4	1012	31.81	253	15.9	63	7.95
	1/2	2023	44.98	506	22.49	127	11.25
Post 1981		1000	31.62	250	15.81	62	7.90
		1500	38.73	375	19.37	94	9.69
		2000	44.72	500	22.36	125	11.18
		2000	40 x 5	-	-	25	5.00

Saplings were not numbered until 1981. Since this time all saplings inside the sampling plots within all subplots are assigned tree number 9999. Saplings will be numbered 9999 from 1981 until the year 2000 when the saplings actual got a tree numbers starting at 8001 (see following page 2000 field season).

PSP's established in immature stands since 1989 (700 series) have sequential numbers assigned to each sapling within the sapling plot. These saplings are not distinguishable from trees in the PSP by number.

Regeneration was also supplied with a number in 1981. For tallying purposes all regeneration, inside the regeneration plots, are recorded as tree number 9998. This record is a dot tally and was recorded for each species.

Tree, Sapling and Regeneration Specifications

When PSP's were first established, all stems inside a subplot boundary were considered either trees or regeneration. The specification of a tree was any stem with a DBH of 0.6 inches or greater and regeneration was all stems less than 0.6 inches DBH to a minimum height of 0.5 feet. With this system, some subplots contained a large number of trees that contained very little volume.

In 1981, the specifications for trees, saplings, and regeneration were developed. Trees were defined as all stems with a DBH of 9.1 cm or more. Saplings were determined to be all stems with a DBH greater than 1.1

cm and less than 9.1 cm. All stems less than 1.1 cm DBH but taller than 0.16 m in height were defined as regeneration.

In the 900 series of drainage plots the sapling category was not used. All stems greater than 1.1 cm DBH were considered trees. No sapling plots were established in these plots.

The regeneration height classes were changed from the original 1960 specifications in 1981 and again in 1983. In the initial change, the height classes were converted from imperial to metric units and were labeled, using the midpoint of each height class and increased from six classes to ten. The 1983 alteration reduced the number of height classes from ten to five and again listed each class using a height range. Each of these classes was assigned a number. The following table is a summary of the changes made to the regeneration height classes.

1960 – 1980	1981 – 1982		1983 - present	
(ft.)	(m)	Midpoint (m)	(m)	Height class
0.5 – 1.4	0.1 – 0.44	0.3	0.10 – 0.30	1
1.5 – 2.4	0.45 – 0.74	0.6	0.31 – 0.60	2
2.5 – 3.4	0.75 – 1.04	0.9	0.61 – 0.90	3
4.5 – 5.4	1.05 – 1.34	1.2	0.91 – 1.20	4
5.5 – 6.4	1.35 – 1.64	1.5	1.20 +	5
6.5 – 7.4	1.65 – 1.94	1.8		
	1.95 – 2.24	2.1		
	2.25 – 2.54	2.4		
	2.55 – 2.84	2.7		
	2.85 +	3.0		

1991

Sapling and regen plots combined. Only the regen plot size is used now (1/16 of plot/sub-plot size).

2000

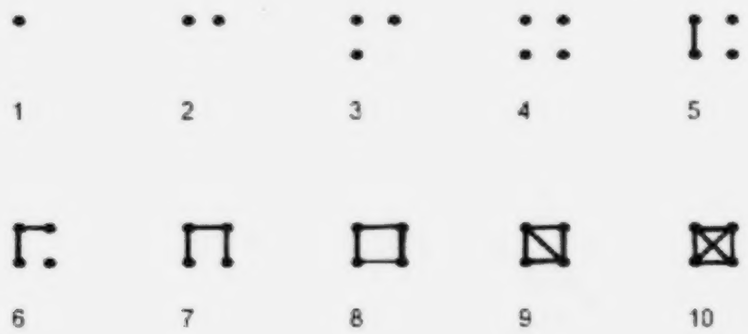
Starting in 2000 field season, sapling located in the 1/16 sapling/regen plot will be measured and tagged just like trees in the tree plot. Any tree that has a height of =>1.3m will be measured, tagged, azimuth and distance taken, etc. All stems ≥ 0.10m in height up to 1.29m inside the sapling/regen plot are tallied as regen. Note that on 700 series type plots (immature) all saplings are already tagged. Trees that are ≥ 1.3m in height are now included, a minimum DBH is not required. These saplings are numbered starting at 8001, 8002,etc.

Saplings are to be measured exactly as a tree if they fall within the 1/16 sapling /regen plot. Saplings are =>1.3m in height. The numbering on sapling start at 8001, 8002, etc. Regeneration (regen) is classified as any stem 0.10m or taller to a maximum Height of <=1.29m. Regen is counted by species and height class and recorded on the regeneration tally sheet (see Figure 2.15) using a standard dot tally.

The five height classes are as follows:

Class 1: 0.10 – 0.30m
Class 2: 0.31 – 0.60m
Class 3: 0.61 – .90m
Class 4: 0.91 – 1.20m
Class 5: 1.21m – 1.29m

The dot tally is recorded as follows:



If regen are present of a species not listed on the tally sheet, such as PF or FA; record the species in the blank spaces in the species column at the bottom of the sheet. To assist in determining which height class a regen is in, the stick used to measure breast height should be marked at 0.10m, 0.30m, 0.60m, 0.90m, and 1.20m.

Regen, as shown on the tally sheet are recorded as tree number 9998.

If there is no regen present in the plot, record "No Tally" diagonally across the green shaded area. On plots with 4 subplots a regen tally form must be completed for each subplot.

2.1.5.1 Crown Width Measurement

Started with year 2000 field season the crown width of a sample of trees/sapling/regen by species will have 4 crown widths measured. The crown width to the North, West, South and East of the selected tree/sapling/regen will be recorded in the comments section. The criteria for selecting trees/saplings/regen to have crown width measured **by species** is as follows for new trees/saplings/regen (previous measured trees/saplings/regen have already been selected).

a) If <10 trees/sapling/regen, select all new trees/saplings/regen for crown measurements.

b) If >10 but <=20 trees /sapling/regen, select every second tree for crown measurements.

c) If >20 but <=40 trees /sapling/regen, select every fifth tree for crown measurements.

d) If > 40 but <=100 trees /sapling/regen, select every eight tree for crown measurements.

e) If > 100 trees /sapling/regen, select every tenth tree for crown measurements.

This measurement is to be taken in the 4 cardinal point directions and is measured from the stem out. A reading of 2.5 metres is to be recorded as 25 (decimeters). This measurement is not to be done on dead trees/saplings/regen. If a tree has died that has been selected to have it crown measured, do not measure dead branches. Select the next tree of the same species as the new crown width tree and record the 4 measurements on the tally sheets. Do not select dying or leaning trees as a new crown width tree. See Figure 2.8.

The crown measurement is estimated at the widest portion (half of crown diameter for that cardinal direction of the foliage looking up from the base of the tree. For deformed or leaning trees/saplings regen do not use due to difficulty in properly calculating crown width. Chose another tree of the same species.

2.1.6 Plot Photography

Colour photographs of each plot are taken once the measurements are completed. These photographs serve as a method of visual documentation of the overstorey and understorey for the plot and cover type. Numbered cards should be used in the photographs to identify the plot. Two photographs are taken from the group plot center in 4 subplotters and plot center of one subplotters; one facing east and the other facing west, with the photographer standing at back from plot center so that the flagged center post is in the photograph. Record picture frame numbers on checklist for subplot #1.

2.1.7 Vegetation and Soils

The Public Lands and Forests Division is interested in correlating PSP data with information regarding site, vegetation and soils. For this reason information and samples are being collected.

2.1.7.1 Vegetation Sampling

Vegetation plots shall be circular with an area of 400m^2 (radius 11.25m) and central around the group centre (pre-1981) or plot centre (post – 1981). Methods of vegetation identification are outlined in Land Information Branch manual "Site Description".

2.1.7.2 Soil Sampling

In plots established before April 1981, the soil sample pit is located as close to group centre as possible without disturbing the vegetation plot.

For plots established after 1981, the pit is located within the buffer as close to the tagged trees as possible. Be careful not to disturb the roots of the tagged trees.

Methods for determining soil type, texture, etc. shall be done as outlined in the Canadian System of Soil Classification. Collected data is recorded on the "Soil Description Form".

2.2 PLOT REMEASUREMENT PROCEDURES

Plots are remeasured according to the time schedule presented in Section 1.1. It is essential that the remeasurement is done accurately as the incremental growth for a particular time frame is necessary for growth and yield calculations. Section 2.1, Plot Establishment, should be read first as it explains the methodology for measurements in this section.

2.2.1 Plot Layout

Permanent sample plots established prior to April 1981 have a different plot layout format and a variety of plot sizes. Each of these PSP's (group) contains four separate plots (see Figure 2.9) with a reservation boundary surrounding the entire group.

The distance from the group centre to the nearest corner of each plot is either 20.1m or 50.3m. With this design the buffer is 100m or 150m from the group centre in any cardinal direction.

The size of a plot varies in order to obtain a minimum of 100 living trees per plot. All plots in each group have the same plot size with sapling plot 1/4 the size of the tree plot and the regeneration plot 1/16 the size of the tree plot. The various tree plot sizes, along with the corresponding sapling/regeneration plot sized are listed on the next page. Post 1981 plot size was changed to 1/16 of plot for both saplings/regen plots.

Pre April 1981 Plot Layout

Tree Plot				**Sapling/Regen Plot**	
Area (ac)	Area (m²)	Side (m)	Diagonal (m)	Plot Area (m²)	Side (m)
1/20	202	14.23	20.12	13	3.56
1/10	405	20.12	28.45	25	5.03

1/8	506	22.49	31.80	32	5.62
1/5	809	28.45	40.23	50	7.11
1/4	1012	31.81	44.98	63	7.95
1/4	2023	44.98	63.61	127	11.25

Note: All distances are horizontal distances

Prior to 1981, all PSPs were established using the above metric measures. PSPs established since 1981 used plot sized given in Section 2.1.2. ie. tree plot of 1/10 hectare. All distances are horizontal distances.

2.2.2 Plot Maintenance

The following items are checked:

1. Evaluate the access (see Appendix 4.7)
2. GPS the reservation boundary (buffer) and repaint/tag it blue. All buffer trees should have a rectangle (22cm x 28cm) painted, (1/3 of the circumference on each tree), at eye level (2m above ground) facing away from plot. The trees used for buffer corners should be painted/tagged on two sides facing out from the plot and have "C" painted on them to indicate a buffer corner and the bearing designation (i.e. NW, SE, etc.) In the event that plot has two blue buffers painted, the incorrect one must be covered with black paint and noted on the maintenance report.
3. Check the condition and tags of all the posts, centre and corners. Replace and retag where necessary.
4. Replace any tree tags and nails if necessary (for example if<2 cm of nail is protruding out). Do not worry about missing tags at this time.
5. Rate the overall condition of the plot and buffer, noting any damages and their location on the plot maintenance sheet (Figure 2.10).
6. Measure all Saplings/Regen and tree plot sides. Record sizes on maintenance tally sheet. These only have to be remeasured if posts/pins have been disturbed since previous measurements. Reproduce map using previous sizes if okay.
7. The tie-point for each plot must be confirmed. This includes checking the distance and azimuth from the plot centre to the tie-point. Keep in mind the distances are horizontal and must be adjusted for slopes exceeding 10%. Whenever possible, a second-tie-point should be established in the event that the original tie-point is destroyed. Suitable tie-points include definite bends in roads, stream crossing such as bridges and culverts or any other permanent land features. A topofil or survey chain must be used to measure the distance between tie points. A vehicle odometer is not accurate by our

standards therefore it is not acceptable for measuring distance. The tie-point must be easily located on a forest cover type map.

8. Ensure North arrow is correctly located on maintenance tally sheet.
9. If there is any type of seismic or logging damage to the buffer or tree plot that was not noted on the previous maintenance report, record details such as distance away from the tree plot, approximate number of trees cut if the tree plot was disturbed and approximate year of damage (needles still present coniferous trees is a good indicator that the plot was disturbed within the last year). Check with supervisor if plot should be closed. If the plot was damaged by seismic activity, look for aluminum tags nailed to a tree along the line. Record all data off the tag on the maintenance report. This will help in determining what company was responsible for the damage.

2.2.3 Plot Assessment at Remeasurement

Plot assessment at remeasurement is done using the same techniques given in Section 2.1.3.4

2.2.3.1 Maintenance Report

The information recorded on the maintenance report is also documented on the Header Sheet. Some of this information is subjective and requires good judgment as budget requirements, planning of field work and other office decisions are based on this information.

The PSP maintenance sheet (Figure 2.10) is located on the reverse side of the PSP Header Sheet, TM 267 (Figure 2.13). For PSP's established before April 1981 where there are four sub-plots the maintenance information should all be recorded on the maintenance sheet of sub-plot one.

The legal location of the group is confirmed once the tie-point information and associated map work is completed (see Appendix 8). A PSP group can conceivably occupy up to four sections and legal sections and legal subdivisions. In the comments section of the PSP Maintenance Sheet you must note the location of plot center. In addition, careful location of the plot on the map is necessary for reservation purposes and relocation for subsequent remeasurements.

Access is extremely important for planning purposes for both remeasurement and maintenance crews. Budget estimates rely heavily on the amount of time it takes to travel to a plot and what type of transportation is required (ie. 4-wheel drive vehicle, all terrain vehicle or helicopter). Access is assessed using the following codes (see Appendix 7).

1	All weather road
2	Dry weather road
3	Deteriorating road
4	All terrain vehicles only
5	Helicopter access only
6	Unknown

Alberta Vegetation Inventory Field (AVI) overstorey calls are determined using the AVI Standards Manual V2.1. This information is used as a field check of photo interpreted overstoreys.

Plot and buffer damage to the plot is assessed using the following codes:

1	No Damage
2	Natural damage
3	Manmade damage
4	Natural and manmade damage
5	Closed

Code 6 is used to indicate buffer damage only.

6	Damage inside buffer greater than 20m from subplot

Code 7 is to be used by office staff only. Field crews ignore this code.

7	Plot was previously closed but has been reopened.

Figure 2.11 illustrates the buffer damage zones for both the large and small groups. The buffer damage zones surround each subplot by 20m from any point on the tree plot boundary. Any disturbance inside a buffer damage zone will have the appropriate damage code recorded for that subplot only. If there is disturbance inside the buffer, that is further than 20m from a subplot, code 6 is recorded. (See Figure 2.12 for examples).

On the PSP Maintenance Sheet, crews must draw in either 1-plot group or a 4-plot group in the space provided. Drawings must be clear and concise so that the information is not misinterpreted.

For those PSPs that contain four plots, the horizontal distance from the group center to the four nearest plot corners is measured. This will assist in re-establishment of the plots if the entire group is destroyed. The plot sides are measured and recorded for each tree plot. Corner posts for the tree plot may have to be re-established using the appropriate distances (Section 2.2.1) if the previous location cannot be found. Sapling/regeneration plots must be located in establishment and remeasurement situations but is not required for general plot maintenance.

Length of sides of buffer are also recorded on maintenance sheet. Each plot has a checklist, which must be completed after the plot is completely finished (one for each subplot on 4-subplot PSP's)

2.2.4 Plot Remeasurement

Before proceeding with the plot remeasurement, obtain a copy of the previous plot measurements to prepare the PSP tally sheets. In the shaded columns, copy the species, DBH and height obtained from the last measurement for each tree number so that comparison can be made between measurements in the field. Previous tree measurements have caused conflicts in the data base are to be noted on the tally sheet and double checked in the field (see Section 2.6)

Field Program Note
In 1998 an electronic field program was developed for data entry of tree measurement data. See instruction manual for how the program operates. A copy of previous measurement data should be kept on hand in a file folder in case of problems with field computer. Spare PSP tally sheets are available from crew leaders.

Plot maintenance tally sheet checklist, and regeneration tally sheets are still to be completed. Once plots has been remeasured, regeneration data has to be inputted into electronic field program. See instruction manual on program.

2.2.4.1 Tree Remeasurement

The size limits defining trees, saplings and regeneration remain the same as stated in the plot establishment procedure (see Section 2.1.4). In addition, all tagged trees that have died and are standing since the last measurement must have DBH measured. On a number of plots, established prior to 1981 and 700 type plots, stems have been tagged that have diameters less than 9.1 cm and were considered as trees. These stems are still to be measured and considered as trees (do not count as saplings if they fall in sapling/regen plot).

2.2.4.2 Species Coding

A species code (see Master Appendix 12) is recorded for all trees unless the tree is missing or cut down. By recording a species, the records for the previous measurement are confirmed. In the event that the species is not the same for a given tree, record the proper code and make a note in the comments section (eg. Tree 70 is a white spruce and write double checked (√ √) species in comments section. Species is recorded for standing dead and dead and down trees.

2.2.4.3 DBH Remeasurement

All tagged stems are measured for diameter directly below the nail. In the event that tag is located below 1.05m or above 1.55m from the point of germination, the diameter is taken at the location; the measurement is recorded in the comment section and the tag is relocated to breast height. This new diameter is measured and recorded in the DBH column on the tally sheet.

In some plots, very small trees have had tags wired to them. Replace the wire with a nail, at breast height, if the tree is large enough to withstand a nail or wire with copper wire and tie tag to wire.

When it is evident that a tag will be grown over within 10 years, remove the nail and replace it with a new nail in the same location. Tags are to be replaced if the number is not legible.

Deciduous trees do not take nails well. Copper wire is used. Leave lots of slack in wire so that tree is not girdled by next measurement. Tie tag to copper wire.

If a tree has died and is still standing since the last measurement, measure and record the current diameter. Trees that are dead and down or standing dead in the previous measurement are not to be measured. Only condition codes 25 or 61 (see Master Condition Code List) are recorded for these situations. Can also add on 2nd or 3rd condition codes if necessary. A tree is determined as dead when there is no evidence of living leaves or buds. Tags are not to be removed but nailed in completely on these trees. Hold tag horizontally when pounding in nail.

In the event that two separate trees have grown together, continue to measure them as separate trees. If a diameter tape cannot be wrapped around the individual trees, use tree calipers and take an average of two measurements, taken perpendicular to each other, for each tree.

If there are two trees with the same number, one of the tags must be replaced and labeled with the number following the last tree number used in the previous measurement for that plot and noted in the comments section.

2.2.4.4 Missing Trees

The missing condition code (15) is used when a previously numbered tree cannot be found. When a specific tree cannot be found, check for trees without tags in the numbering sequence that are the same species and have a comparable diameter. If the tree is the one in question, retag the tree; otherwise it is considered ingrowth. In plots that have been stem mapped, the azimuth and distance information can be used to locate missing trees. Stem mapping, itself, often locates missing trees by checking that all trees, with condition codes other than 15 or 61, have an azimuth and a distance. Do not record a species if the tree is missing.

2.2.4.5 Ingrowth

All untagged stems in the tree plot that now have a DBH ≥9.1 cm must be tagged, measured, and stem mapped. The tree numbers for these stems will start with the number following the last tree number in the previous measurement. The exception to this is 700 series plots, refer to Section 4.11.

2.2.4.6 Completing the Tree Remeasurement

Tree heights and heights to live crowns are measured using the procedure outlined in Section 2.1.4.4. Do not take heights on trees that were previous sample trees and have died since the last measurement. Crown classes are recorded as stated in Section 2.1.4.6 and condition codes (see Master Condition Code List) are applied to tagged trees and saplings. Stem mapping is done on remeasurement plots only if it has not been done in previous measurement. Ingrowth is stem mapped. Do not measure ages and increment widths unless directed to do so.

2.2.4.7 Sapling and Regeneration Remeasurements

The sapling/regen plot is measured in the same manner outlined in Section 2.1.5

2.2.4.8 Nails

Nails should be pulled out as the trees grow. Maintain the 2.4-3.5 cm of nail extruding from the tree. Turn tag at 90° from the tree and pound the nail in it tree standing is dead.

2.2.5 Plot Photography

Colour photographs are taken as directed in Section 2.1.6. For plots established prior to 1981, the photographs are taken at group center, with the photographer standing so that the flagged group plot center is in the photograph.

2.3 PLOT CLOSURE

PSP's are never closed. PSP's lost to Forest Fires have a regeneration type PSP established over top of the old one.

2.3.1 Re-opened Plots

If a plot was previously closed, every attempt to re-open it should be made. The plot should be checked for missing, dead, or cut-down trees. If the tags were removed, an attempt to locate or re-establish plot corners should be made. If plot corners cannot be re-established, a recommendation to cancel the plot shall be made to the Forester in charge and the reservation will be cancelled.

2.4 DATA ENTRY ON HEADER AND TALLY SHEETS

Measurements taken on permanent sample plots are recorded on Permanent Sample Plot Header Sheets (TM267), Permanent Sample Plot Tally Sheets (TM249) and on Regeneration Tally Sheets (TM261). Data recorded on the front of each tally sheet in the white columns is keypunched in the same format to keep the tally sheets and computer files compatible. It is important that all letters and numbers are legible to avoid keypunch errors resulting in costly computer errors. Quality measurements are of no value if they are not legible. See Appendix 14 for common problems.

2.4.1 PSP Header and Tally Sheets

The PSP Header Sheet is separated into a section of general information and is recorded as type: 01 (see Figure 2.13 – columns 36,37).

The PSP Tally Sheet is separated into one record type: 02 (see Figure 2.14 – columns 36, 37).

2.4.1.1 General Information (columns 1-37)

This information must be recorded on the Header Sheet and repeated in the green shaded area of every Tally Sheet. The following columns match the electronic database format.

Column	**Name**	**Data Entry**
1	Agency	Right justified, zero filled. The agency list is in Appendix 4.10.1.1
3	Group Number	Right justified, zero filled eg. 20 is written as 020 (see Figure 2.13)
13	Sub -Plot Number	Numeric 1-4. Sub Plot number is always 1 for plots established since April 1981.
14	Measurement Number	Numeric, zero filled 00 for establishment, subsequent measurements are 01,02,03, etc. eg. 3rd remeasurement records as 03
16	Year	Recorded to 4 digits
20	Month	Right justified, zero filled eg. June is recorded as 06
22	Day	Right justified, zero filled. Note: Date is the same on all tally sheets even if the sub plot took several days to measure
24	L. S. (Legal Subdivision)	Right justified, zero filled – 2 digits
26-27	Section	Right justified, zero filled – 2 digits
28-30	Township	Right justified, zero filled – 3 digits
31-32	Range	Right justified, zero filled – 2 digits
33	Meridian	Right justified, zero filled
34	Plot type	Left justified, zero filled, priorized. Where no codes are used, '000' fill.
37	Imp	An "x" is written only if the data is collected in imperial units, blank if collected in metric.

2.4.1.2 Record Type 01 – Header Information (Columns 38 – 212)

This information is filled out on the Header Sheet of each plot.

Column	**Name**	**Data Entry**
38-39	Record Type	Right justified, always "01"
40 – 60	Tree plot Size Saplings Plot Size Regen Plot size	Right justified, zero filled in square metres for the three plot sizes. The horizontal distances for each plot side is measured and recorded on the maintenance sheet. The plot sizes are calculated and recorded in the office.
61-71	Phase 1, 2 or 3 Interpreted Type Overstorey	
61		**Density** Code — Crown Density % A — 6-30 B — 31-50 C — 51-70 D — 71-100 All stands>6.0m average stand height
62		**Height** Code — Stand Height

		0 0 - 6.0 m 1 6.1 - 12.0 m 2 12.1 – 18.0 m 3 18.1 – 24.0 m 4 24.1 – 300. m 5 >30.m
63-70		Species composition is listed as a percent of the gross roundwood (13/7) (13 cm stump, 7 cm top) volume for stands over 12 m in height. For stands under 12 m in height the crown cover is used for species composition.
		Species is recorded in order of decreasing content up to a maximum of three species above 20% (major). Species 11-20% are recorded in brackets (minor) and species 10% or less are not recorded.
		An understorey is recognized only when it is two or more height classes lower than the overstorey.
		An example of a field overstorey and a field understorey type is: B3AW (PL) and A1SW. Note: These columns are only completed at establishment by offices staff.
		Left justified
71		Overstorey Stand Commercialism
72-93	AVI Interpreted Type Overstorey	See 4.10.1.2 for methodology
94-108	Phase 1,2 or 3 Interpreted Type Understorey	
94		**Density** Code Crown Density % A 6 – 30 B 31 – 50 C 51 – 70 D 71 – 100 All stands >6.0 m average stand height
95		**Height** Code Stand Height 0 0 – 6.0 m 1 6.1 – 12.0 m 2 12.1 – 18.0 m 3 18.1 – 24.0 m 4 24.1 – 30.0 m 5 >30.0 m
		Species composition is listed as a percent of the gross roundwood (13/7) (13 cm stump, 7 cm top) volume for stands over 12 m height. For stands under 12 m in height the crown cover is used for species composition.
		Species is recorded in order of decreasing content up to a maximum of three species above 20% (major). Species11-20% are recorded on brackets (minor) and species 10% or less are not recorded.
96 – 103		An understorey is recognized only when it is two or more height classes lower than the overstorey

		An example of a field overstorey and a filed understorey type is B3AW (PL) and A1SW. Note: These columns are only completed at establishment by office staff.
		Left justified.
104		Understorey Stand Commercialism
105-108		Understorey Stand Origin
109-128	AVI Interpreted Type Understorey	See 4.10.1.2 for methodology
129	Location	
130-132	Slope Percent	Right Justified
133-134	Aspect	N, W, NE, etc. "NA" for No Slope
135-138	Elevation	Right justified
139	Erosion Potential	
140	Drainage	
141-142	Depth to Mineral Soil	Right Justified in cm.
143	Surface Vegetation Type	
144-146	Ground Cover Percent	Right Justified
147	Access	
148	Plot Damage	
149	Buffer Damage	
150-153	Establishment Year	
162-163	Plot Type	Usually=1 may have other management practices done on plot later and will have to be changed.
164	Plot configuration	Always – 1
180-183	Stand Origin	
184	Site Index/TPR	Character
185-186	Site Index/TPR	Numeric
187-190	Photo Year	
191-193	Stand Structure	
194-198	Ecosite	
199-201	Aspect in degrees	Right Justified
202	Nutrient Regime	
203-204	Natural Subregion	Right Justified
205-208	Minimum Diameter Measured (mm)	Right Justified
209-210	Stump Height (cm)	Right Justified
211	Surface Expression	
212	Slope Position	

2.4.1.3 RECORD TYPE 02 (COLUMN 38-124)

Header information columns 1 to 37 are repeated on each record.

COLUMN	NAME	DATA ENTRY
38-39	Record Type	Right Justified, always "02"
40-43	Tree Number	Right Justified, numeric, either: -consecutive 1 ->9997 (tagged trees/saplings) -0000(felled trees outside plot) -(number prefilled on Header Tally Sheet) Filled in prior to remeasuring with the previous measurements to assist in remeasurement. This area is not keypunched.

	Darkened columns – Species, DBH, Height	
44-45	Species	Recorded as two capitalized letters as given in Section 2.1.4.1
46-49	DBH	Right Justified to one decimal point.
50-53	Height	Right justified to one decimal point.
54-57	Height to Live Crown	Right justified to one decimal point.
58	C.C.	Crown class is recorded as one letter (D,C,I,S, or 0) as per section 2.1.4.6
59-64	Condition codes	Left justified, recorded as a 2 digit number, as per Section 2.1.4.7, but do not zero fill eg. a leaning tree with conks is recorded as 5851 blank, blank. If a tree has no defect, it is recorded as '00'.
65-67	DBH Age	Right justified, recorded only for tree numbers 0000.
68-70	Stump age	Right justified, recorded only for tree numbers 0000.
71-73	Stump Increment Width-Previous 10 Years	Measured as indicated in Figure 2.7. Recorded to one decimal place in centimeters. Zero filled, eg 23 mm is recorded as 02.3. In digital file entered as mm.
74-76	Stump Increment Width-Previous 11-20 years	In digital file, entered as mm.
77-79	Azimuth	Right Justified, recorded as 1°-360°.
80-82	Distance	Right justified to one decimal point.
83-89	Tree Plot Size (m^2)	Right justified
90-96	Sapling Plot Size (m^2)	Right justified
97-103	Regen Plot size (m^2)	Right justified
104-107	Establishment Year	Right justified
108	Crown Status	"Y" indicates tree needs crown measurements "Blank" indicates no crown measurement required.
109-112	Crown Width North	Recorded in decimeters (dm). Right Justified
113-116	Crown Width West	Recorded in decimeters (dm). Right justified
117-120	Crown Width South	Recorded in decimeters (dm). Right justified.
121-124	Crown Width East	Recorded in decimeters (dm). Right justified.

2.4.1.4 Other Data

Information that is shaded in green and to the right of record type 01 on the Header Sheet is not keypunched. It is, however, required that this data be recorded: crew, page number including the regen tally sheet (eg. 1of 10), photo and line number, and tie point. Space is also provided at the bottom of the page of the Header Sheet or any comments the crew would like to record.

On the Tally Sheet, comments may be entered in the darkened columns to the right of the record type 02. For example, tree # 243 is near tree #100.

Height measurements are recorded and calculated on the back of the tally sheet.

An increase in buffer size must be noted in the comments section.

2.4.2 *Regeneration Tally Sheet*

The regeneration tally sheet is separated into general information and record type 03 (see Section 2.4.2.2 columns 38,39).

2.4.2.1 *General Information (Columns 1-37)*

This area is shaded in green but is still the same format, as described in Section 2.4.1.1 with the same data as recorded on the PSP Header Sheet.

Header information 1 to 37 is repeated on each record.

2.4.2.2 *Record Type 03 (Columns 38-85)*

COLUMN	NAME	DATA ENTRY
38-39	Record Type	Right Justified, always "03"
40-43	Tree Number	Pre-entered, is always 9998 for regeneration
44-45	Species Darkened columns – Height Class 1-5	Recorded in the blank column at the bottom of the sheet, as two capitalized letters as per Section 2.1.4.1, if the species presents is not already listed.
46-48,49-51,52-54, 55-57,58-60	Total (1-5)	Used to record the dot tally. This area is not keypunched. Right justified, zero filled, numeric.
61-67	Tree Plot Size (m^2)	Right justified
68-74	Sapling Plot Size m^2)	Right justified
75-81	Regen Plot Size (m^2)	Right justified
81-85	Establishment Year	Right justified

2.5 VEGETATION AND SOILS

Vegetation and soil data are collected at remeasurement only if it has not been done at establishment or if directed to do so by office staff.

2.6 DOUBLE CHECKING TALLY SHEETS

Before leaving the PSP, crews will double check for shrinking or non-growth DBHs, height and species changes. Place a double check mark in the comments section to note that the correct information was tallied.

ie.	√√	SP	double checked species
	√√	DBH	double checked diameter
	√√	HT	double checked height

Before handling in tally sheets to the supervisor for keypunching, please double check that the following information is recorded correctly on the Header and Tally Sheets:

1. Write clearly and concisely. Keypunchers do not know what codes mean and cannot interpret sloppy writing.
2. Erase all extra marks in the white area of tally sheets, or they will be keypunched, ie. checkmarks in the azimuth columns.
3. Check again for any species changes and for shrinking DBHs and heights
4. There should be no crown classes for dead and down, cutdown, standing dead, missing broken top, broken stem and severe leaning trees (>45°)
5. Crown classes are recorded for dead tops and die back (code 16).
6. Make sure heights have been correctly calculated and copied properly from the back to front of tally sheets
7. Make sure all header information is the same throughout group.
8. Trees that are coded as missing (15) or cutdown (29) should not have a species.
9. All pages are in place and in order
10. If using a direct read suunto, make sure it is mentioned on the Tree Height Calculation sheet and the appropriate columns are relabeled.
11. Code 25 & 61 trees need the species recorded in column 42-43

3.0 PLOT CHECK

Plot checks are done to ensure that the standards or measurement for permanent sample plots are being met. These standards are designed to minimize non-sampling errors that occur in all sampling. The standards given here are for the maximum error allowed before the plot must be redone. Plot checks should be viewed as a method of assessing the performance of field crews with the intent of identifying the human errors that can occur due to a lack of care or knowledge in field procedures.

3.1 Inspection Procedures

PSP and regeneration tally sheets should be checked in the field office to ensure that all the appropriate columns have been filled (eg. plot size, species, DBH, C.C. etc.). The heights are recalculated using the data recorded on the back of the PSP tally sheet. Plots that lack certain data or where the data appears incorrect should be selected for a check.

Plots should be field inspected when a new crew first begins establishment or remeasurement in order to monitor training needs and to identify and correct recording errors.

The following technique is used to check plots:

1. Using a PSP Tree Tally Check Sheet (Rev. 4/87) (TM 249) (Figure 3.1) record the group and subplot number, photo information, date of check cruise, check cruise page number, names of initial field crew, and the names of the check crew for each of the plots selected for checking. Before proceeding to the field, record the data from the original tally sheets, for approximately 10% of the tagged trees including the tree number, DBH, crown class, condition codes, and azimuth and distance (when recorded) on the sheet. In addition, 10% of the measured and height to live crown measurements should be checked.

2. The selected trees are measured and tallied directly below the copied data measured by the field crew. The two measurements are compared and should be within the allowable error limits (see Section 3.2). On the Check Cruise Tally Sheet, only measurements not within the allowable error shall be "blocked in" red. If the two measurement are not within the allowable error limits, always assume the check cruise is correct. Transfer the Check Cruise Height that is "blocked in red" to the tree height calculation sheet (back of PSP Tally Sheet TM 249) as well as changing the appropriate information on the front of the tally sheets. If measurement errors are common, additional trees may be checked. Other tree plot items that may be checked include buffer painting, recorded elevations, tag replacement, etc. Data pertaining to plot establishment, plot assessment, and stem analysis (when recorded) are also checked.

3. It is important to show the field crew the original tally sheets and the check crew sheets in order to point out any discrepancies. Any problems with the plot measurements should be discussed in order to prevent future errors.

4. When the check cruise has been completed, the overall evaluation of the PSP is graded as excellent, very good, satisfactory, fair, or unsatisfactory. The following is a guide used to evaluate the plot.

    - Excellent - no mistakes have been found in the check cruise
    - Very good - an occasional, minor error has been found in the check cruise
    - Satisfactory - a few errors have been found but their severity is minimal
    - Fair - errors are frequent and of a greater severity. Additional field work is required to correct the major mistakes
    - Unsatisfactory - errors are common and judged to be severe. Field work is required as the errors constitute an unacceptable plot and must be redone

    Plots that have a grade of satisfactory or above can have any necessary corrections made on the tally sheets. The tally sheets are then submitted for keypunching.

3.2 Allowable Errors

The following is a guideline used to judge the correctness of each measurement type or required duty.

3.2.1 Plot Establishment

1.	Tie Point	Should match landmarks on Phase 3/AVI inventory map. For example seismic lines, drainage, oil well site, pipeline etc.
2.	Tie Plate Tree	Should be clearly visible, painted blue and adequately flagged.
3.	Tie Line	Bearing and horizontal distance to the plot center must be within the plot center location allowable error. The tie line should also be flagged or painted blue arrows.
4.	Location of Plot Centre	Correctly marked and within ± 2% of the tie line horizontal distance.
5.	Access Notes	Condition of access to the plot correctly noted.
6.	Post – Tree Plot Size	Must be ± 0.8%, ie, distance 31.62 m ± 0.25m (31.37 to 31.87m) 38.73 m ± 0.31 m (38.42 to 39.04 m) 44.72 m ± 0.36 m (44.36 to 45.08 m) bearings from plot center to each corner post must be within 2° of specified bearings.
	Sapling/Regen Plot Size	Must be ± 0.8%, i.e. distance 7.90 m ± 0.06 m (7.84 to 7.96 m) 9.69m ± 0.08 m (9.61 to 9.77 m) 11.18m ± 0.09 m (11.09 to11.27 m)
	Tagged and Stable	All posts must be sturdy and correctly marked

3.2.2 Plot assessment

Office staff are responsible for correctly recording all plot sized in square metres. The field overstorey and understorey (where appropriate) must be correctly identified using Phase 3/AVI specifications. Plot topography, soils, surface vegetation and the maintenance report must be reasonably estimated.

3.2.3 Tree and plot measurement

1. No. of Trees Tallied	Tree Plot	No allowable error. All Tress identified, as within or outside the plot must be correct.
	Sapling Plot	The allowable error is ± 5% of the total number of saplings tallied.
	Regen Plot	The allowable error is ± 10% of the total number of regen tallied.
2. Species Identified	Tree Plot	No Allowable error
	Sapling Plot	No allowable error
	Regen Plot	5% of the total number of regen tallied may incorrectly identified.
3. DBH		Breast height should be correctly located at 1.3m ± 6.5cm from the point of germination. The allowable error for the tree DBH ±1.0cm.

4. Height and Height to Live Crown		The allowable is ± 3% with discretion used for the identification of where the live crown begins.
5. Crown Class and Condition Codes		Only 5% of the stems tallied may have an incorrect crown class or condition code.
6. Stem Mapping		The allowable error for azimuth is ± 2° and for distance is ± 0.5m

3.2.4 Stem analysis

1. Section Lengths		The allowable error is ± 5 cm from the proper length after the "cookie" is cut.
2. Perpendicular Cuts		The allowable error is ± 10° from the perpendicular for cutting "cookies".
3. Ages		± 1 year for coniferous trees, ± 5 years for deciduous trees

3.2.5 Check cruising standards

The check cruiser will usually check a minimum of 10% of the stems within a plot. More than 10% may be checked at the check cruisers discretion. Stem analysis tree are to be checked individually and are excluded from the minimum 10% within the tagged tree plot.

1.	Diameters	If more than 3% of the total tagged trees checked (within the plot) are not within the 1.0 cm error range the entire plot/subplot will have the diameters remeasured this includes dead trees). Included in this are tags that are not readable, nails not put in at a slight downward angle, mislabeled tags (ie. numbers, written horizontally, not vertically), nails too deep or too loose.
2.	Heights	If more than 20% of those heights checked are out, the cruisers heights for that plot/subplot will be rejected.
3.	Condition Codes	If more than 5% of the condition codes checked are missed or incorrect, the condition codes for that plot shall be re-done. A "missed" code will count as an error.
4.	Crown Class	If more than 5% of the crown classes checked are incorrect, all the crown classes for that plot will be re-done.
5.	Stem Mapping	If more than 5% of the combined check of azimuths and distances are incorrect, stem mapping will have to be re-done.
6.	General	Tie points and corner posts shall be marked with orange and blue geo-flagging tape. Tie lines will be marked in 20 m intervals with orange flagging tape.
7.	Flagging Colour Codes	Orange – height trees/regen pins/tie line; Orange and blue – plot/subplot corners; Orange blue & yellow – group center; Yellow - problem trees, swaths, boundaries.

References for Condition Code Assessments for Wildlife

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Harrison, H. 1979. Western Birds Nests. Peterson field Guide Series. 280 pp.

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Murie, O.J. 1975. A Field Guide to Animal Tracks. Houghton Mifflin. 375 pp.

Rangen, S.A. and L.D. Roy. 1997. A Field Guide to Animal Damage of Alberta's Native Trees. Alberta Research Council. Vegreville, Alberta. ARCV97-R1. 58 pp.

Sousa, P.J. 1987. Habitat Suitability Models: Hairy Woodpecker. Biological Report 82(10.146). U.S. Department of the Interior. Fish and Wildlife Service. 19 pp.

Master Condition Codes

Alberta
SUSTAINABLE RESOURCE
DEVELOPMENT

PSP MANUALS
MASTER
CONDITION CODE LIST

MARCH 2005

Public Lands and Forests Division
Forest Management Branch
8th Floor, 9920 – 108 Street
Edmonton, AB
T5K 2M4

Phone: (780) 427 - 8474
Or visit the website: http://www3.gov.ab.ca/srd/forests/psp

CONDITION CODES

CODE	DESCRIPTIONS	CODE	DESCRIPTIONS
00	Healthy	47	Witche's Broom
01	Insects	48	Frost Crack
02	Disease	49	Dying
03	Rabbit Browsing	51	Conks/Blind Conks
04	Shepherd's Crook	52	Open Scars
05	Browsing (Other animal)	53	Burls and Galls
06	Fire	54	Fork
07	Mechanical	55	Pronounced Crook
08	Windthrow	56	Broken Top (DBH > 9.1) (No CC) (see "24" for DBH <9.1)
09	Climate	57	Limby
10	Flooding	58	Severe Lean (No CC) – see code #35
11	Poor Planting	59	Broken Stem (>=10cm DIB at Break DBH >9.1) (No CC)
12	Suppression	60	Generic woodpecker feeding (often smaller species)
13	Frost Heaving	61	Dead and Down (No CC)
14	Erosion	62	Stem Insects (Bark + Sawyer Beetles)
15	Missing	63	Stem Disease (Cankers)
16	Dead Top/Dieback	64	Foliar Insects
17	Poor Seedbed	65	Foliar Disease (Needle blights + rusts)
18	Herbicide	66	Stem Form Defect (>=7.0cm DIB at point where stem form begins)
19	Western Gall Rust (only on Pine)	67	Closed Scars
20	Armillaria Root Rot	68	Atropellis canker
21	Moldy Planting Stock	69	Comandra Blister Rust
22	Multiple Leader	70	Elytroderma needle cast of pine
23	Poor Form	71	Hypoxylon Canker
24	Broken Top (DBH <9.1) (see "56" for DBH > 9.1)	72	Spruce cone Rust
25	Dead Tree Standing (No CC)	73	Stalactiform Blister Rust
26	Snow Press (No CC)	74	Tomentosus Root Rot
27	Dead Top Dieback with NEW Leader	75	Spruce Spanworm
28	Sucker(s) (from OLD Stump)	76	Spruce Cone Maggot
29	Cut down	77	Spruce Cone worm
30	Terminal Weevil	78	Eastern Spruce Budworm
31	SW Gall Adelgid	79	Mountain Pine Beetle
32	Tent Caterpillar	80	Spruce Beetle
33	Root Collar Weevil	81	Spruce Needle Rust
34	J-Root	82	Yellow Headed Spruce Sawfly
35	Leaning (No CC) – see code # 58	83	Large Aspen Tortrix
36	Same Stump	84	Excavations by woodpeckers
37	Unknown	85	Yellow-bellied sapsucker feeding
38	Pitch Moth	86	Small mammal feeding on tree bole
39	DBH Taken on New Leader	87	Small Cavity
40	Nutrient Deficiency	88	Large Cavity
41	Mouse (feeding)	89	Hollow tree or hollow bole section
42	Ungulate feeding/rubbing	90	Beaver (feeding/harvesting)
43	Domestic livestock (rubbing)	91-96	Hawksworth Mistletoe Rating System
44	Nest	97	Available for future consideration
45	Other mammalian/avian evidence	98	Data changed by office
46	Sweep/Bow/Bend	99	Do not look for tree

Note: No CC means no crown class.

CONDITION CODES DESCRIPTION

Condition Codes	Description
00 Healthy	No Defect.
01 Insects	Damage or mortality due to destruction of plant parts or tissue by insects. Look for evidence of eggs, egg cases, nests, chewed plant parts, etc. Similar signs on plants located off site may aid in identification of insect mortality.
02 Disease	Damage or mortality caused by disease or fungi. Cankers, discoloration, rust spotting, fungal coverings, etc. help to identify mortality under this code.
03 Rabbit Browsing	Trees killed or damaged by rabbits can be identified by clean, sharp cut marks along the branches and stems (approximately 45° angles). Chewed bark and needles also indicate rabbit damage.
04 Shepherd's Crook	Damage results in blackening and wilting of young shoots and leaves. Tips of the blackened shoots often bend back. On older leaves brownish black, irregularly shaped spots appear.
05 Browsing (other animals)	Mortality or damage due to browsing by ungulates or other animals (e.g. moose, cattle, beavers). Look for chewed tops with rough cuts or breaks.
06 Fire	Mortality or damage due to actual burning of the seedling or scorching by nearby flames. **Not to be used when seedlings are killed by sun scald**.
07 Mechanical	Trees killed or damaged by mechanical or physical means such as scarification machinery, trampling or crushing by animals, etc. Stem scars and rough breakage help to identify mortality under this code.
08 WindThrow	Damage or mortality due to crushing by fallen or displaced logs, snags, branches, uprooted trees, etc.
09 Climate	Trees damaged or killed solely by climatic factors. These include death by freezing, sun scald, severe desiccation, ice accumulation, red belt, etc.
10 Flooding	Trees damaged or killed by drowning alone. Look for evidence of high water marks on the seedling, or in the immediate area. Pull tree out of ground and check roots to see if the root outer coverings is falling off and is blackened.
11 Poor Planting	Damage or mortality due to improper placement of nursery stock (hand or mechanical planting). Trees may have been planted too deep, too shallow, too loosely, or at an acute angle.
12 Suppression	Trees which have been suppressed by the surrounding vegetation for a period of time long enough to damage or kill them. Mortality may be due to severe lack of light, water, nutrients (removed by the competition) or by physical smothering (i.e. heavy grasses). Reference to the previous year's damage tally may help in determining this mortality call. A tree that is over topped by grass or shrubs is not necessarily suppressed. Look for a spindly main stem with very few long needles spaced wide apart or evaluate the last five increments. If the tree has only grown 1cm a year, it is probably suppressed.
13 Frost Heaving	This code is used only when mechanical frost action can be clearly identified as the direct cause of damage or mortality. Usually upheaval and separation of the seedling's root system from the soil occurs as a result of ice lens formation. This is most commonly associated with containerized seedlings planted in silty soil.
14 Erosion	Damage or mortality due to the removal of the seedling's seedbed, by the forces of water, wind or soil slumping. Trees killed by partial or total burial (deposited soil or organic matter) would also be tallied using this code.

15	Missing	This code is to be used when a seedling from the previous year's measurement cannot be located. It can also be used where the seedling was removed from the site and probably died (i.e. tag found, no morphological signs of live seedling remaining). Using in conjunction with code 25 **ONLY**.
16	Dead top/Dieback	Top is dead (die back) without any indication of insect or climate (frost) damage. See Figure 4.31
17	Poor Seedbed	This code is to be used only when the cause of death or damage for a seedling can be traced to the type of seedbed on which it is growing. In most cases the seedling will show signs of desiccation due to the poor moisture holding capacity of the seedbed material (e.g. rotten logs, dry clay).
18	Herbicide	Should only be used when the cutblock (or parts of the cutblock) has received a recent herbicide treatment; either before or after the stock was in place. Spruce seedlings exhibit needle loss and/or reddish brown coloration of stems and foliage. Deciduous species exhibit yellowish/brown leaf mottling and dieback of terminal growth. Hexazinone causes reddish brown coloration of conifer foliage and needle loss. Deciduous foliage turns red to black. Glyphosate causes chlorosis especially in new growing shoots. 2,4-D causes rapid growth and spiralling and twisting. If applied during conifer flush bad dieback similar to frost damage may occur. Often chemical damage will also be indicated by phytotoxicity spotting on exposed foliage.
19	Western Gall Rust (only in Pine)	This code is used when Lodgepole pine damage or death can be attributed to Western Gall Rust. This is usually clearly identifiable due to swelling of succulent tissue (and subsequent formation of a gall) and the bright orange spores produced in that affected area. This gall can be on the main stem or a lateral branch.
20	Armillaria Root Rot	This code is utilized when a seedling is damaged or killed by Armillaria Root Rot. Identification of the disease is in recognizing mycelial fans of the cambium of damaged and dead trees. Pull tree out of ground and examine root collar.
21	Moldy Planting Stock	This code is usually used on Bareroot Planting Stock. Grey mold will usually be found around the root collar and lower branches.
22	Multiple Leader	When a tree has two or more leaders, but is otherwise healthy this code should be entered. The tree is considered multiple leader if all leaders are within 5cm (height) of each other. This code also applies to saplings and regeneration that appear forked. Be aware of normal branching of deciduous trees.
23	Poor Form	This code is used on trees, which exhibit a general poor form, due to previous damage. DBH < 9.1 See code 66 for >9.1 DBH
24	Broken Top (DBH <9.1) (see "56" for DBH > 9.1)	It should be used as long as the broken top is noticeable and has some effect on the growth of the tree.
25	Dead Tree Standing (No CC)	Tree has no signs of being alive. A standing dead tree is one that is dead but still standing. No green foliage or buds present. The tree must be able to withstand a firm push. Record a diameter and species but do not record height. Pound nail into tree. **No crown class**.
26	Snow Press (No CC)	This code is normally used for trees that show signs of being pressed down to the ground for a few years after germinating. May Happen to bigger trees. See Figure 4.8
27	Dead Top Dieback with New Leader	This refers to stems that have had previous leader damage and a new leader has formed.
28	Sucker(s) (From Old stump)	Refers to stems that have been cut-down through thinning and have started to sucker. Do not re-use the previous stem number, but assign a new number to each sucker.
29	Cutdown	Self explanatory.
30	Terminal Weevil	Terminal leaders of Pine or Spruce bend over and die. Two or more years growth are affected. **Bore Holes** which are exit holes for the larvae **MUST** be present to

	use this code.
31 SW Gall Adelgid	Adelgid galls on spruce located at the end of new growth and may persist for many years.
32 Tent Caterpillar	A tent of silk forms on the tree and the caterpillars defoliate the tree.
33 Root Collar Weevil	This weevil feeds mainly on Sw, Pj and Pl. They feed in the bark and cambial area of the host tree at or below the duff surface, causing copious flows of resin. The tunnels often girdle small trees. This insect allows root rots to enter the tree.
34 J-Root	This code is used after the tree has had a poor planting code in the previous measurement.
35 Leaning (No CC) see code 58	Tree leaning more than 20% off of vertical axis.
36 Same Stump	Used when 2 or more trees can be distinguished above ground level but below DBH. Used a lot on Deciduous that have been cutdown and resprouted at stump.
37 Unknown	This condition code is to be used only when there appears to be something affecting the tree but the other condition codes do not describe the situation. This would include burnt trees etc. A description of what is affecting the tree should be included as well in the comments column. In the event that this code is used for more than 5% of the tallies, it is up to the crew leader or a forester to decide on the cause of the condition.
38 Pitch Moth	Primary host is Lodgepole Pine. May weaken or kill the terminal leader, resulting in stem deformities and height growth reduction. Blisters are mainly on main stem and are characteristic resin coated up to 20mm in diameter.
39 DBH Taken on New Leader	
40 Nutrient Deficiency	This may occur on blocks that have had the humus layer removed by scarification (i.e.; Blade). Trees are chlorotic and usually in bare mineral soil. Usually noted on spruce. May be confused with flooding damage.
41 Mouse Feeding	Mice and voles can girdle seedlings and consume seeds. See Rangen and Roy (1997) for more detail.
42 Ungulate feeding/rubbing	Ungulate feeding on twigs is generally recognized by the ragged appearance of twig terminals. Rubbing of trees as antler rubs and feeding on bark also occurs; these conditions are further described in Rangen and Roy (1997). Antler rubs can also be associated with "scrapes" (smaller patches of scraped ground) and small tufts of hair on twigs. If the bark on aspen trees has been consumed ensure that ungulates (as opposed to other mammals) are responsible. The extent of the bitten area, track identity and grooves that indicate tooth size and pattern should all be inspected in order to differentiate ungulate bark feeding from similar feeding by small mammals (i.e. see code number 86 and applicable photograph).
43 Domestic livestock (rubbing)	Rangen and Roy (1997) describe rubbing of trees by livestock; rubbed trees are occasionally seen in areas where cattle grazing occurs. If this code is used, ensure that other signs in general area (i.e. presence of cattle droppings, cow trails and grazed vegetation) also supports this.
44 Nest	This code indicates the presence of a nest on a given tree in the PSP. It refers only to an "open" nest; cavity nests are excluded from this category, as it is difficult to ascertain if a given cavity is indeed used as a nest site. Field guides that assist with the identification of "open" nests are available (see Harrison 1979). Of particular importance are colonial complexes of large nests on islands in lakes. Mammalian nests also exist and should be indicated as such if this is known. To do this, use the comments section which applies to a given tree and indicate as required. If the occupants of the nest can be identified, the identity can also be entered in the comments section.

45 Other mammalian/avian evidence	Other agents (i.e. bears, grouse, shrew, pocket gophers) which leave evidence on trees or leave evidence closely associated with trees are described in Rangen and Roy (1997). Pocket gophers leave soil mounds (Rangen and Roy - (1997). Bears can leave a characteristic series of claw marks on aspen trees, indicating that the tree was scaled, and rotted stumps/logs are also occasionally ripped apart. In addition, it has been suggested that bark on live trees is occasionally consumed (see Hiratsuka 1987 for a depiction). Ensure that ripped up stumps/logs, etc. are accompanied by other evidence of bear.
46 Sweep/Bow/Bend	Is a gradual bowing or curving of the main tree system. It has no decay significance but may cause a loss of volume in a sawlog.
47 Witches Broom	Yellow witches broom is the most conspicuous disease of spruce in the province. Can be recognized from a distance. See Figure 4.10
48 Frost Crack	A frost crack is a deep radial splitting of a trunk caused by an uneven shrinkage of the wood after a sudden drop in temperature. The cracks usually start at the base and extend up the trunk. They may re-opened repeatedly by wind stresses or a low temperature.
49 Dying	Tree is in distress and will die before next measurement.
51 Conk/Blind Conks	Conks appear most frequently on the underside of dead branch stubs or on the underside of live branches in the crown. Conks, by definition, are woody, shelflike basidiocarps (fruiting bodies) of wood-rotting fungi. See Figure 4.3
52 Open Scars	Open scars are wounds which have been penetrated through to the cambium. These wounds must not be healed over and may be caused by a variety of reasons such as fire, lightning, old blazing, machinery, animals, etc. Scars are considered to be entry points for decay fungi. Open scars are illustrated in Figure 4.4. Animal damage usually penetrates the cambium therefore code as an open scar. A common mistake is to call stem disease such as atropellis canker an open scar. See Figure 4.4
53 Burls and Galls	Burls are abnormal swelling of the main stem or branches resulting from abnormal wood cell development following disturbance to the cambial layer. A burl is illustrated in Figure 4.5. Galls are localized trunk and branch swelling of mainly tissue. There is little or no damage to the underlying wood.
54 Fork	Forks usually develop when there is malformation, injury or death of the terminal leader. Forks tend to be V-shaped and will only be recorded when above 1.3 m (DBH level). Forks below this point are recorded as same stump (condition code 36). Natural branching on deciduous trees is not to be recorded. Figure 4.6 demonstrates the difference between forks and natural branching.
55 Pronounced Crook	This condition develops from the death of the terminal leader or the breaking off of a forked leader. When this occurs, a lateral branch takes over apical dominance as shown in Figure 4.7.
56 Broken Top (No CC) (see "24" for DBH <9.1)	Broken tops occurs usually in the top third of the tree. **No Crown Class**.
57 Limby	A tree is recorded as limby if more than 75% of the tree has live, low sweeping branches. Usually branches on coniferous >2.0m on any part of tree could be considered limby.
58 Severe Lean (No CC) see code 35	A tree is considered leaning if it is standing greater than 20° off of vertical (see Figure 4.8). If the angle is greater than 45° to the ground, the tree has a severe lean. **No crown class if severe**.

59	Broken Stem (No CC)	A broken stem is recorded if the tree bole broken. Usually found in bottom 2/3 of the tree. **No crown class**.
60	Generic woodpecker feeding (often smaller species)	Figure 4.13 indicates feeding by woodpeckers. Species such as the Black-backed woodpecker and Three-toed woodpeckers will often leave signs like this on old coniferous trees, and Hairy and Downy woodpeckers typically peel off scales ("scale") and "peck" the bark as do Pileated woodpeckers in summer months (Conner 1979). Note the evidence of very small holes (arthropods) and holes made by the woodpeckers themselves. The appearance of tree trunks fed on in this manner is often reddish from a distance.
61	Dead and Down (No CC)	A dead and down tree is one that was previously tagged and measured in a PSP plot but at the present time is now dead and no longer standing. The cause of death must be by natural causes (i.e. windfall, beavers, insect or disease, etc.). **No crown class**.
62	Stem Insects (Bark + Sawyer Beetles)	This code is recorded when there is evidence of an insect infestation attacking the bole of the tree. Bark beetles are the most prevalent stem insects but sawyer beetles and others are included. Bark beetles, Dendroctonus spp., are a very serious problem in Alberta. The adult female enters the bark in early summer and lays eggs in the tree's cambium. The eggs overwinter and hatch as larvae in the early spring. Damage to the tree is done by the larvae eating the cambium and usually results in death. The tree will not turn red until the next summer. Other symptoms of attack are piles of "sawdust" (frass) at the base of the tree, entry holes in the bark, and pitch tubes (the tree tries to push the beetles out with resin). The beetles also carry a blue stain that causes further deterioration of wood quality. Beetles attack all species of pines, spruce, and Douglas fir. Sawyer beetle infestations are common in burned timber.
63	Stem Disease (Cankers)	All diseases that infect the main stem are documented with this code. Included in this code are cankers, rusts, rotten branches and root rot. Stem cankers are caused by fungi that invade stems and branches resulting in localized areas of infection in the bark and underlying wood tissue. Cankers may be annual or perennial. In perennial cankers the infected area may be eventually exposed to the underlying wood when the deadbark sloughs off. A common stem canker on lodgepole pine is Atropellis piniphila (Figure 4.9). Exudation of resin from the bark surface is the first external symptom. They are sunken elongated on one side of the trunk and indicate resin flow. This can cause a distortion in growth and a blue-black stain on the wood. Stem rusts are also included in this condition code. Rusts are host specific parasitic fungi usually requiring two alternating living hosts. Stems and branches may be girdled resulting in large malformations or even death. In particular, Endrocronartium harknessii on young pines is a serious problem in Alberta. Spruce broom rust, Chrysomyxa arctostaphi (see Figure 4.10), can also be noted but only if the broom is no longer green (i.e. red or missing needles). Large rotten branches typically appear on overmature, decadent trees and can be indicative of decay. Large rotten branches are those well below the base of the live Crown and are > 5 cm in diameter, are unweathered, appear punky, and are weeping. Often a black ring appears on the stem surrounding the branch. Some of the typical symptoms of Armillaria root rot are reddish brown or yellowish foliage; mycelial fans form between the bark and wood around the base; fungal (shoestring) strands in the soil surrounding the diseased roots and honey mushrooms growing around the base of the diseased tree.

64	Foliar Insects	This condition code pertains to all insects that infest parts of the tree off the main stem. Included in this category are the tent caterpillar, spruce budworm, jack pine budworm, spruce gall aphid, etc. The forest tent caterpillar, Malacasoma disstria, causes severe defoliation in hardwood stands in Alberta resulting in a significant reduction in annual growth. The spruce budworm, Choristoneura fumiferana, infests mature white and black spruce, and balsam fir stands. This insect attacks the buds and new needles. Their feeding spreads to old needles and eventually kills the tree. The jack pine budworm, Choristoneura pinus, attacks stands of jack and lodgepole pine and is a relatively new forest pest in Alberta. This insect feeds and spreads in the same manner as the spruce budworm.
65	Foliar Disease (Needle blights + rusts)	This code is used for all diseases that infect parts of the tree off the main stem. Needle casts and blights, and needle rusts are included in this condition code.
66	Stem Form Defects	This condition code is used when there is damage or a distortion resulting in a loss of volume. Used for trees >9.1 DBH. See code 23 for <9.1cm DBH. A sweep or bend is the gradual bowing or curving of the main tree stem. If has no decay significance, but may cause a loss of volume in a sawlog. Spiral grain is the twisting of the grain seen in exposed wood or in the direction of the bark fissures. Spiralling frost cracks and scars also indicate the presence of spiral grain. Windshake is a splitting in the wood along the grain or less frequently within an annual growth layer. It is caused by wind or snow stresses and is also known as ringshake.
67	Closed Scars	Wounds that had penetrated the cambium but have now healed over are considered closed scars. A closed scar is characterized by an irregular indentation in the bole of the tree that would result in loss of volume due to poor wood quality. Before healing over, the scar provided an entry point for disease. Frost crack is not included in this code.
68	Atropellis Canker	Widespread on pine, from small to large trees. Symptoms are elongated, sunken, cankers on the stem with copious yellowish resin flow. Wood is discoloured blue/black. Figure 4.9
69	Comandra Blister Rust	Pl and Pj are hosts. Local occurrence only. Infected stems are spindle-shaped with conspicuous swelling of the bark. Fungus is orange-yellow in early summer. Cankers are circular and grow laterally as quickly as longitudinally. They thus girdle the stem faster than stalactiform. It should not be confused with western gall rust, which is mainly a swelling of the wood. Alternate host is Indian Paint Brush.
70	Elytroderma Needle of Pine	Mostly on Pl. Current years needles turn red in fall. In severe cases only current needles remain, giving branches a "lion's tail" appearance.
71	Hypoxylon Canker	Hosts are aspen and balsam poplar. Canker starts as a slightly sunken orange-yellowish area on stem. Eventually girdles the stem and has an orange/black appearance. A mycelial fan on the cambium is a reliable field symptom.
72	Spruce Cone Rust	Rust is only on spruce cones. Cones become prematurely brown then orange-yellow. When spores are abundant, the forest floor has an orange colour.
73	Stalactiform Blister Rust	Pl and Pj are hosts. Local occurrence. Causes slight swelling of bark. Orange-yellow in summer. Cankers are elongated and grow faster longitudinally compared

		to Comandra. Alternate host is Bastard Toad Flax.
74	Tomentosus Root Rot	Most important on Sw and Sb. Symptoms are excessive branch mortality, thinning of crown and openings in the stand. Disease develops slowly (over 15-20 years) so is not so obvious in regenerating stands.
75	Spruce Spanworm	Chiefly affects aspen. Damage shows mostly as holes in the leaves. Resembles forest ten caterpillar but no pupal cases or egg masses on the foliage. Caterpillars are typically light green and have one prominent and two indistinct yellowish lines along each side of the body. The head is dark-brown.
76	Spruce Cone Maggot	No external symptoms. Dissected cone shows frass-filled spiral tunnel around the central axis.
77	Spruce Cone Worm	Feeding larvae expel frass, which adheres to silken webbing on cone surface.
78	Eastern Spruce Budworm	First symptoms are webbing and frass in buds or on previous year's needles. Later, webbing is spun on branch tips. By late June tree crowns appears rust brown.
79	Mountain Pine Beetle	Main host is Pl. Symptoms are standing dead trees with beetle exit boles about eye-level. Accumulations of pitch or sawdust are conspicuous around entrance holes bored into the bark of trees by adult beetles from mid-July to mid-August.
80	Spruce Beetle	Host are Sw and Se. Symptoms are standing dead trees with beetle exit holes about eye-level. Conspicuous boring dust accumulates on bark below holes until the wind blows it away.
81	Spruce Needle Rust	Feed on needles in the upper crown of the tree. Partly chewed needles and needle stubs impart a brownish color and ragged appearance to the foliage. No webbing present. Found on all spruce.
82	.Yellow-Headed Spruce Sawfly	Discoloration of needles. May find dotlike sexual fruiting structures on needles. Infected needles drop prematurely.
83	Large Aspen Tortrix	Affected foliage has a clumped, irregular appearance and leaves do not move as freely in the wind as uninfested leaves. Larval instars feed within rolled leaves or within 2 or more leaves pulled together and secured with silken webbing.
84	Excavations by woodpeckers (likely Pileated woodpecker)	Feeding by Pileated woodpecker can occur on dead or scenescent deciduous and coniferous trees, and feeding holes (as indicated in the figures below) are thought to occur towards the base of the tree (Rangen and Roy 1997). Excavated holes indicate subcambial penetration (holes penetrate beneath the bark and into the sapwood) and large wood chips can be associated with excavations. Excavated feeding holes can be large (Figure 4.16). In such excavations, evidence of carpenter ants (burrows, sawdust) or other boring arthropods might also be found in the sapwood. In living trees with a sound bole, initial feeding holes might be more restricted such as that indicated in Figure 4.12. Elsewhere in North America, the Pileated woodpecker has been found to excavate holes extensively in winter and to a grater extent that other woodpeckers (Conner 1979). The Hairy woodpecker might also create deeper holes in trees, however, it is considered an opportunistic feeder (Sousa 1987) and spends a smaller portion of its time "excavating" during winter months (Conner 1979). In Iowa, it has also been found to generally feed at higher locations in trees (5-7m) (Sousa 1987). If this feeding evidence exists on a given tree, indicate in comments its extent (i.e. restricted, such as in Figure 4.16).
85	Yellow-bellied sapsucker feeding	Figure 4.14 illustrates the characteristic pattern of regularly spaced small holes left by Yellow-bellied sapsucker (also see Hiratsuka 1987 for another depiction of sapsucker feeding). These are often found on birch, however they also have been observed on willows, and have been reported on aspen and pine (Rangen and Roy 1997, Hiratsuka 1987).
86	Small mammal feeding on tree bole (hare,porcupine, squirrel, bushy-tailed	Figure 4.15 is an example of feeding by hare on small saplings. In this case the bark was bitten off. When hares feed on twigs, it is generally thought that twigs are clipped off in a characteristic razored fashion (Figure 106, Rangen and Roy, 1997). Small mammals such as porcupine, woodrat and squirrel might also feed on bark

	woodrat)	however, if such feeding evidence occurs high in trees, one could probably rule out hare because hare do not climb trees (also see Hiratsuka 1987 for a depiction of porcupine feeding on pine). Ensure other evidence (i.e. tracks, pellets, etc.) Supports a specific determination of the agent involved. Also refer to Rangen and Roy (1997) for more information on how to identify the specific causes of girdling and refer to Murie (1975) for assistance on identifying tracks if this is required. Evidence of squirrel feeding is common and could also be indicated, however, the value of this information is probably less valuable.
87	Small Cavity	Small woodpeckers create small cavities (approximately 5 cm in diameter) in snags and stubs (Figure 4.17), however, height of the cavity above ground probably varies. Among the species which might use such cavities are smaller woodpeckers, kestrel, chickadee, nuthatch, swallow, wren, flycatchers, and small mammals (etc). One could explore whether such cavities are occupied by rubbing the bark with a stick. Should a cavity be occupied the occupant (if known) should be identified in the comments section.
88	Large Cavity	A large cavity is a round/excavated opening greater than or equal to 10 cm in diameter (see Figure 4.18). The cavity in the figure was approximately 15 m high. Pileated woodpeckers have been known to excavate such cavities, however, a variety of species (birds as well as mammals) may use them as nest sites, roosting sites or dens. As in the case of smaller cavities, one could investigate the identity of the occupant by rubbing/tapping the bark of such trees with a stick. If might be possible to ascertain the identity of the tracks which are associated with the cavity, during winter, by checking surrounding snow cover and identifying tracks that appear to lead towards the cavity in the tree (see Murie 1975).
89	Hollow tree or hollow bole section	Hollow trees can be used as denning sites by bats and other birds and mammals. This condition code should be used to identify these sites.
90	Beaver (feeding-/harvesting)	Beaver girdle large trees in a characteristic fashion and evidence of their harvesting activities (i.e. cone shaped stumps) are well known to many. Refer to Rangen and Roy (1997) and Hiratsuka (1987) for more details.
91-96	Hawksworth Mistletoe Rating System	Dwarf mistletoes are parasitic flowering plants requiring living hosts. Mistletoe is usually recognized by swellings on branches and stems or by witches brooms. Heavy infestation makes trees susceptible to secondary attack (such as bark beetles), lower wood quality and growth losses (can be from 30-60%). The major tree hosts in Alberta are: lodgepole pine, Douglas fir and larch. Figure 4.11 illustrates the effect resulting from mistletoe infestations and the individual flowering plant. The Hawksworth Rating System for mistletoe is used to determine the severity of mistletoe infestation on individual trees. Figure 4.12 outlines instructions and gives an example of the use of the 6-class mistletoe rating systems (Hawksworth 1961, 1977). If a tree has mistletoe, record only the 90 series code, do not record 33 unless there is a second distinct foliar disease.
97	Available for future consideration	
98	Data changed by office	
99	Do not look for Tree	

Master
Appendicies

Alberta
SUSTAINABLE RESOURCE
DEVELOPMENT

PSP MANUALS
MASTER
APPENDICES

MARCH 2005

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Forest Management Branch
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1. SUGGESTED EQUIPMENT AND SUPPLIES

Accountable – Individual	Accountable - Crew	Expendable
Clinometer	Staff compass	Spiral nails (6.5 cm)
Surveyors hand compass	Axe	Blue tree marking paint
Metal diameter tape	Cloth tape(s) (50m)	Plot posts-metal (corner, regen and sapling)
Loggers tape	Photo holder	Pencils 2H and grease
Topofil	Camera	Geo-flagging tape (orange, blue and yellow)
Biltmore stick	Calipers (tree and seedling)	Aluminum tags-plot corner and tree
Claw hammer	Chainsaw, tool box, stretcher and necessary safety equipment	String
2 lb hammer	Canthook	Loggers crayon
Hammer holder	Whistle	Field notebook
Pocket calculator	Tally Sheets (TM 267, TM 249, Regen and Sectioning)	Paint pens/markers
Douglas protractor	Cruisers Vest	Tie plates
Hand lens	Hard Hat/with shield	
Tallyboard (metal 8x12)	ATV/snowmobile helmet	
Pocket First Aid Kit	Trapper Nelson backpack	
Flare gun with flares and bear bangers	Crayon holder	
Bear repellent	Seedling calipers	
Engineers scale (15 cm)		

2. PLOT TOPOGRAPHY

a. *Location*

1 – Hollow	For plots located in local topographic depressions – collecting water
2 – Flat	For plots located on flat terrain – receiving water
3 – Slope	For plots on mid and upper slopes – shedding water
4 – Hilltop	For plots located on ridge crests – shedding water

3. SOIL CODES

a. *Erosion potential*

1 – Slight	When 0 to 25% of the area is, or could be eroded in a flood situation.
2 – Moderate	When 26% to 75% of the area is, or could be eroded in a flood situation.
3 – High	When more than 75% of the area is, or could be eroded in a flood situation.

b. Drainage Codes

1 – Very rapidly drained	Water is removed from the soil very rapidly relation to supply. Excess water flows downward very rapidly if underlying material is permeable. There may be very rapid subsurface flow during heavy rainfall provided there is a steep gradient. Soils have very low available water storage capacity (usually less than 2.5 cm) within the control section and are usually coarse textured, or shallow, or both. Water source is precipitation.
2 – Rapidly drained	Water is removed from the soil rapidly in relation to supply. Excess water flows downward if underlying material is permeable. Subsurface flow may occur on steep gradients during heavy rainfall. Soils have low available water storage capacity (2.5-4 cm) within the control section, and are usually coarse textured, or shallow, or both. Water source is precipitation.
3 – Well Drained	Water is removed from the soil readily but not rapidly. Excess water flows downward readily into underlying permeable material or laterally as subsurface flow. Soils have intermediate available water storage capacity (4-5m) within the control section, and are generally intermediate in texture and depth. Water source is precipitation. On slopes subsurface flow may occur for short durations but additions are equalled by losses.
4 – Moderately Well	Drained Water is removed from the soil somewhat slowly in relation to supply. Excess water is removed somewhat slowly due to low permeability, shallow water table, lack of gradient, or some combination of these. Soils have intermediate to high water storage capacity (5-6 cm) within the control section and are usually medium to fine textured. Precipitation is the dominant water source in medium to fine textured soils, precipitation and significant additions by subsurface flow are necessary in coarse textured soils.
5 – Imperfectly Supply	Drained Water is removed from the soil sufficiently slowly in relation to keep the soil wet for a significant part of the growing season. Excess water moves slowly downward if precipitation is major supply. If subsurface water or ground water, or both, is main source, flow rate may vary but the soil remains wet for a significant part of the growing season. Precipitation is main source if available water storage capacity decreases. Soils have a wide range in available water supply, texture, and depth, and are gleyed phases of well drained subgroups.
6 – Poorly drained	Water is removed so slowly in relation to supply that the soil remains wet for a comparatively large part of the time the soil is not frozen. Excess water is evident in the soil for a large part of the time. Subsurface flow or ground water flow, or both, in addition to precipitation are main water sources; there may also be a perched water table, with precipitation exceeding evapotranspiration. Soils have a wide range in available water storage capacity, texture, and depth and are gleyed subgroups, Gleysols and Organic soils.
7 – Very poor drained	Water is removed from the soil so slowly that the water table remains drained at or on the surface for the greater part of the time the soil is not frozen. Excess water is present in the soil for the greater part of the time. Ground water flow and subsurface is less important except where there is a perched water table with precipitation exceeding evapotranspiration. Soils have a wide range in available water storage capacity, texture, and depth, and are either Gleysolic or Organic.

4. TREE HEIGHT MEASUREMENT

The height of a tree is defined as the length between the point of germination and the tip of the terminal leader. Heights are measured using a clinometer (with the percent scale) and a 30 or 50m measuring tape. Tree height calculations must be completed on the reverse side of the PSP Tally Sheet (TM 249) (see Figure 4.2A). All data fields are required to be filled in except:

a) Only Slope distance and slope % or horizontal distance is used.
b) Correction Factor is only used when the bottom % reading is recorded at a different reference point other than the germination point. ie. DBH height = 1.3m
c) Check cruise height columns are not to be used by field crew members. This space is only filled in if there has been an actual check cruise completed.

It is very important that field crews understand the process of measuring height so that data is calculated correctly.

At a distance far enough away from the tree to keep the clinometer scale below 100%, take readings for the top % of the tree (tip of the terminal leader), top % to live crown, and the bottom % of the tree (germination point) as shown in Figures 4.1. This may be difficult for deciduous trees as the top of the tree may not be visible through the crown. The slope of the ground must also be measured and recorded if it is greater than 10%.

During remeasurement if the present height is shorter than the past height then a second height must be taken and recorded on the tally sheet directly below the previous measurement. It is advised that the horizontal distance be increased 5 to 10 meters before taking the second reading. It will be up to the cruisers discretion to decide which is the correct height data to be transferred to the front of the tally sheet. Put a line through the height information that is not used **-never erase height information**. On the front of the tally sheet record in comments **HT** to indicate that the height was double-checked in the field.

If live crown height is measured using a metric tape instead of the clinometer, record on the front of the PSP tally sheet (TM 249) in the comments section "height to L.C. measured directly" (Figure 2.14, tree #10).

You should be approximately 25% further than previous height; ie. previous height is 20.2m, you should be 25.2 m, 36.0m should be 43.0m

Also record the slope and slope distance or horizontal distance to the tree. To calculate the tree height, to the nearest 0.1 m, use the following formula:

Top reading % - Bottom reading %
Slope Distance x Slope Correction Factor x
= Tree Height (m) ______________________ **x 100%**

or

$$\textbf{Horizontal Distance x } \frac{\textbf{Top reading \% - Bottom reading \%}}{\textbf{100\%}} \textbf{ = Tree Height (m)}$$

For example, is 22.8 m away on a slope of 15%. The Suunto readings are +80% and +12%. Therefore, the tree is:

$$22.8\text{ m} \times 0.989^{*} \times \frac{+80-(+12)}{100} = 22.55 \times 0.68 = 15.33 = 15.3\text{m}$$

*Obtained from table in Section 4.5

$$22.8 \times \frac{+80-(+12)}{100} = 22.8 \times 0.68 = 15.5\text{m}$$

There are times when the germination point cannot be seen. In this situation, breast height is often used for the bottom % reading and a correction factor of 1.3 m is added on the calculated total height.

Trees with a lean that require height measurement should have the slope readings taken from a location perpendicular to the lean as shown in Figure 4.2. This will prevent an erroneous measurement that could result in a shorter or taller tree because of the lean.

If at all possible, all height measurements should be taken perpendicular to the slope.

Common errors made during tree height calculations are:

1) Misreading ± signs
   - bottom % readings may either read as positive or negative numbers. Bottom % reading are always subtracted from the top reading regardless on the ± sign of the number.

   ie: if the top % is +90 and bottom % is –3 then:

   $+90-(-3)=93$

   if the bottom % reading was +3 then:

   $+90-(+3)=87$

2) Not adding the appropriate correction factor, usually 1.3m (breast height). Zero fill if the bottom reading is taken at the germination point, or put line through column.

   a) adding the correction factor at the wrong time:

ie:

top %	bottom %	Horizontal distance	Correction factor
+90	-3	20	+1.3

Incorrect $([90-(-3)]+1.3) \times .20 = 18.86 = 18.9$

Correct $([90-(-3)] \times .20) + 1.3 = 19.90 = 19.9$

3) Miscalculating total height through standard arithmetic errors. Refer to Appendix 4.10.4 for rounding off procedures.

4) Total height information recorded with no calculations.

All tree height calculations must be recorded for each sample tree in the space provided otherwise, the data will be considered invalid and deleted.

TM 249 (Rev. 08/03)

Tree Number	Species	Top %	Top % to Live Crown	Bottom %	Not to Top of Tree	Not to Top of Live Crown	Slope Distance	% Slope	Horizontal Distance	Correction	Total Height	Height to Live Crown	Check Cruise Height	Tree Number
1	SW	92	33	+3	89	30	-	-	20.0	+1.3	19.1	7.3		1
4	SW	84	60	-1	85	61	22.0	13	21.8	-	18.4	13.3		4
7	SW	98	28	0	98	28	-	-	24.0	+1.3	24.8	8.0		7
10	SW	64	10	-2	66	12	-	-	20.0	+1.3	14.5	3.7		10
13	AW	73	63	+1	72	62	-	-	21.0	-	15.1	13.0		13
16	PB	99	80	0	99	80	-	-	25.0	+1.3	26.0	21.3		16
24	SW	No	Height	Forked	Top									

a. *Determining Tree Height with a Laser Clinometer or Haglof Vertex*

Before using the electronic instrument, be sure that you are familiar with the operators manual and the operation of the tool.

Only total tree height and height to live crown is recorded on the tree tally sheet. Indicate on the back of the sheet which tool was used.

The operator must have the blue direction dot in sight and double check the height of the tree if it does not grow or the height remains the same. Record both sets of numbers on the back of the tally sheets.

5. SLOPE CORRECTION FACTORS AND TABLES

To convert slope distance (S.D.) horizontal distance (H.D.)

$$H.D. = S.D. \times \text{slope distance factor}$$

To convert horizontal distance (H.D. to slope distance (S. D.)

$$S.D. = \frac{H.D.}{\text{slope distance factor}}$$

SLOPE DISTANCE FACTORS

% Slope			% Slope			% Slope	
10	0.995		40	0.928		71	0.819
11	0.994		41	0.925		71	0.815
12	0.993		42	0.922		72	0.812
13	0.992		43	0.919		73	0.808
14	0.990		44	0.915		74	0.804
15	0.989		45	0.912		75	0.800
16	0.987		46	0.908		76	0.796
17	0.986		47	0.905		77	0.792
18	0.984		48	0.902		78	0.789
19	0.982		49	0.898		79	0.785
20	0.980		50	0.894		80	0.781
21	0.979		51	0.891		81	0.777
22	0.977		52	0.887		82	0.773
23	0.974		53	0.883		83	0.769
24	0.972		54	0.880		84	0.766
25	0.970		55	0.876		85	0.762
26	0.968		56	0.872		86	0.758
27	0.965		57	0.869		87	0754
28	0.963		58	0.865		88	0.751
29	0.960		59	0.861		89	0.747
30	0.958		60	0.857		90	0.743
31	0.955		61	0.854		91	0.740
32	0.952		62	0.850		92	0.736
33	0.950		63	0.846		93	0.732
34	0.947		64	0.842		94	0.729
35	0.944		65	0.838		95	0.725
36	0.941		66	0.835		96	0.721
37	0.938		67	0.831		97	0.718
38	0.935		68	0.827		98	0.714
39	0.932		69	0.823		99	0.711

6. USE AND CONSTRUCTION OF A BILTMORE STICK

Biltmore Sticks are used to measure diameter of saplings or tagged stems <9.1 cm as measuring a stem with a small diameter often results in a broken diameter tape. To use a Biltmore Stick, align "0" on one side of the stem, at breast height, and read the diameter on the other keeping the focal length at 64cm (metric equivalent of 25 in [1]). The following table shows the straight line distance from "0", to be marked on the stick, associated with the corresponding diameter (in centimeters).

---

[1] Avery, T.E. and H. E. Burkharl. 1983. Forest Measurements. 3rd ed. McGraw-Hill Inc., New York, N.Y. pp. 68-69

DBH	Biltmore	DBH	Biltmore
1.0	0.99	5.2	5.00
1.2	1.19	5.4	5.19
1.4	1.38	5.6	5.37
1.6	1.58	5.8	5.55
1.8	1.77	6.0	5.74
2.0	1.97	6.2	5.92
2.2	2.16	6.4	6.10
2.4	2.36	6.6	6.28
2.6	2.55	6.8	6.46
2.8	2.74	7.0	6.65
3.0	2.93	7.2	6.83
3.2	3.12	7.4	7.01
3.4	3.31	7.6	7.18
3.6	3.50	7.8	7.36
3.8	3.69	8.0	7.54
4.0	3.88	8.2	7.72
4.2	4.07	8.4	7.90
4.4	4.26	8.6	8.07
4.6	4.44	8.8	8.29
4.8	4.63	9.0	8.43
5.0	4.81		

7. ACCESS EVALUATION CODES

1. All Weather Road	All roads in this category are paved or are well traveled gravel roads. These roads are well drained with little possibility of washing out or flooding in heavy rain situations. In the winter, these roads are plowed on a regular basis.
2. Dry Weather Road	This type of road tends to be quite slippery in the spring and fall and becomes heavily rutted when wet. The shoulder on these roads are generally quite soft most of the year. Slopes on these roads should not exceed 10% as they are difficult to drive up or down when wet, even in a four wheel drive vehicle. Minor flooding or washouts can occur but the roads can still be traveled in a four wheel drive vehicle as the roads have solid bottoms.
3. Deteriorating Road	These roads are not used very often and are starting to grow over with grass, small shrubs, or small trees. During heavy rains they can be easily washed out or heavily rutted. It may be very difficult to travel on these roads even with a four wheel drive and the use of an all terrain vehicle should be considered.
4. All Terrain Vehicles only	Included in this category are seismic lines, old trails, and any roads inaccessible using a four wheel drive vehicle. If a plot is more than 1000m along a seismic line or trail, this access is to be indicated. If the distance is less than this, the remeasurement crew can walk to the plot.
5. Helicopter Access.	This access codes should be used only when there is no other way into the plot (i.e. cannot cross river, too far off roads to feasibly drive all terrain vehicle to etc.) It is important to remember to have a suitable location for a helicopter to land and take of from. Keep in mind that openings used for a landing may grow over within 10 years presenting a helicopter to land in the future
6. Unknown	This code is for office use only and is used when access has not been verified and maps do not provide any assistance.

8. LEGAL SURVEY SYSTEM OF ALBERTA

The province of Alberta has been surveyed using a system based on a grid framework. The largest divisions in this system are called meridians. In Alberta there are meridians numbered 4, 5 and 6. The fourth meridian, as shown in Figure 4.19 corresponds to the Alberta Saskatchewan border.

Each meridian has been divided into parcels of land, called townships, 36 square miles (93.2 square kilometers) in size. At six mile (9.654 kilometres) intervals, in a north-south direction, are divisions also called townships and are numbered 1 to 126 starting from the United States border and extending to the Northwest Territories border. The east-west six mile intervals are called "ranges" and are numbered westward from each meridian. The numbering of townships begin in the southeast corner of the province. An example of locating any given township is shown in Figure 4.19.

The grid system is further refined by taking each township and dividing it into 36-one square mile (1.604 square kilometers) parcels of land called "sections". The numbering scheme for each township is shown in Figure 4.19.

The last division in the survey system takes each section and divides it into 16 equal parts called "legal subdivisions" (LSD's). The numbering scheme of each section is demonstrated in Figure 4.19.

If a PSP was located using the example in Figure 4.19, the legal land description would be recorded as 13-1-87-18-4. This translates to Legal Subdivision 13 of Section 1 in Township 87, Range 18, West of the Fourth Meridian. If a PSP is located in two or more sections/legal subs, all legal descriptions are tallied and the location of plot enter is noted, i.e. if a PSP was located at the cross section of legal subs 11, 12, 13, and 14 then the following information would be tallied.

Recorded on Maintenance Sheet as:

11-1-87-18-4
12-1-87-18-4
13-1-87-18-4.1 (this would be recorded as the correct legal descriptions)
14-1-87-18-4

The center of the PSP falls in L.S. 13-recorded on the PSP Header Sheet (TM 267) during establishment or remeasurement.

9. FIELD SHEET HANDBOOK

a. *Tally Sheet Instructions*

The PSP field handbook contains instructions pertaining to data entry on the tally sheet, a summary of allowable errors, and a plot measurement summary.

b. *General Information (Columns 1 – 37)*

This information is recorded on the Header Sheet and every Tally Sheet.

Column 1-2

Agency: numeric, right justified, zero filled. As listed on the Agency list.

Column 3-12

Group Number: numeric, right justified, zero filled.

e.g.

0	2	0	= Group 20

Column 13

Sub Plot Number: numeric (1,2,3,4)

e.g.

1	= sub plot 1

Column 14-15

Measurement Number: numeric, '00' for an establishment plot, subsequent measurements would be 01, 02, 03, etc.

e.g.

0	3	= 3rd measurement

Column 16-18

Year: numeric; 1961

e.g

1	9	6	1

Column 20-21

Month: numeric, right justified, May=05, June=06, etc., zero filled.

e.g.

0	6	= June

Column 22-23

Day: numeric, right justified, zero filled.

e.g.

0	3	= 3rd day

Column 24-25

L.S.: (Legal Subdivision), numeric, right justified, zero filled, only use if known.

e.g.

1	3	= Legal subdivision 13

Column 26-27

Section: numeric, right justified, zero filled.

e.g.

0	2	= Section 2

Column 28-30

Twp.: (Township), numeric, right justified, zero filled.

e.g.

0	3	2	= Township 32

Column 31-32

Rge.: (Range), numeric, right justified, zero filled.

e.g.

0	3	= Range 3

Column 33

M.: (Meridian), numeric.

e.g.

5	= West of the 5th meridian

Column 34-36

Plot Type: Numeric, and left justified. First column is primary description. The remaining two columns are not defined yet; zero fill until further notice.

e.g.

3	0	0	= Thinned PSP

e.g.

0	0	0	= An untreated fire origin plot

Code

0 = No treatment
1 = Growth Intercept Plot
2 = Fertilized
3 = Thinned
4 = Drained
5 = Burned
6 = Mistletoe
7 = Immature (16-55 years)
8 = Paired Plot
9 = University of Alberta Plot

Column 37

Imp.: (Imperial), "X" if information is collected in imperial units; blank if collected in metric.

e.g.

X

= Indicates measurements done in imperial units.

c. *Record 01 – Header Information (Columns 38-212)*

Column 38-39
Record Type: previously filled as 01

Column 40-60
Plot Sizes (Tree, Sapling and Regen): numeric, recorded in square metres right justified. Plot sizes are determined in the office using the horizontal distances recorded on the plot maintenance form.

e.g.

		1	0	0	0	.0

= 1,000.0 m2

Column 61-71
Phase 1, 2 or 3 Overstorey - See PSP Header information for description.

Column 72-93
AVI Interpreted Overstorey: numeric and alpha using AVI ecological moisture regime, crown closure class, height and tree species composition.

Ecological moisture regime can be numeric or character. Small cap letter goes in column 72. If using numeric label this goes in column 73. Do not input both. Only one entry needed.

Ecological Moisture Regime Labels

Moisture Regime	Database Numeric Label	Database Character Label
Very xeric	0	d - dry
Xeric	1	d - dry
Subzeric	2	d - dry
Submesic	3	m – mesic (default)
Mesic	4	m – mesic (default)
Subhygric	5	m – mesic (default)
Hygric	6	w - wet
Subhygric	7	w - wet
Hygric	8	a - aquatic

Crown closure class can be numeric or character. Capital letter goes in column 74. If using numeric, label goes in column 75. Do not use both. Only one entry needed.

Crown Closure Class Labels

Crown Closure	Database	Database

Class (%)	Numeric Label	Character Label
01-05		V
06-10	0	A
11-20	1	A
21-30	2	A
31-40	3	B
41-50	4	B
51-60	5	C
61-70	6	C
71-80	7	D
81-90	8	D
91-100	9	D

Height is recorded to the closest metre and is numeric and goes in columns 76 and 77. Input as 2 digits i.e.: 9m = 09.

Tree species composition is recorded in 10% classes and must add up to 100%. A maximum of 5 species. First letter is capitalized and second letter is small.

Species 1 (Alpha) in Columns 78-79
Species 1 % in Columns 80-81
Species 2 (Alpha) in Columns 82-83
Species 2 % in Columns 84
Species 3 (Alpha) in Columns 85-86
Species 3 % in Columns 87
Species 4 (Alpha) in Columns 88-89
Species 4 % in Columns 90
Species 5 (Alpha) in Columns 91-92
Species 5 % in Columns 93

e.g.

d	1	A	2	0	9	S	w	0	9	P	l	1			

Column 37

Imp: (Imperial), "X" if information is collected in imperial units; blank if collected in metric.

e.g.

X = indicates measurement done in imperial units.

Column 94-108

Phase 1, 2 or 3 Understorey – See PSP Header information for description.

Column 109-128

AVI Interpreted Understorey: numeric and alpha using AVI crown closure class, height and tree species compositions.

Crown closure class can be numeric or a character. Capital letter goes in column 109. If using numeric, label goes in column 110. Do not use both. Only one entry needed.

Height is recorded to the closest metre and is numeric and goes in columns 111 and 112. Input as 2 digits i.e.: 9m=09.

Tree species composition is recorded in 10% classes and must add up to 100%. A maximum of 5 species. First letter is capitalized and second letter is small.

Species 1 (Alpha) in Columns 113-114
Species 1 % in Columns 115-116
Species 2 (Alpha) in Columns 117-118
Species 2 % in Columns 119
Species 3 (Alpha) in Columns 120-121
Species 3 % in Columns 122
Species 4 (Alpha) in Columns 123-124
Species 4 % in Columns 125
Species 5 (Alpha) in Columns 126-127
Species 5 % in Columns 128

e.g.

A	2	0	9	S	W	0	9	P	l	1

Column 129
Location: numeric

Code

1 = hollow
2 = flat
3 = slope
4 = hilltop

e.g.

3

= plot location on a slope

Column 130-132
% slope: average percent slope for the plot, numeric characters, right justified.

e.g.

0	1	5

= 15% slope

Column 133-134
Aspect: alpha characters, right justified

Code

N = North

S = South
E = East
W = West
NE = Northeast
NW = Northwest
SE = Southeast
SW = Southwest
NA = Non Applicable (Slope = "0")

e.g.

	N	= North

Column 135-138

Elevation: elevations in metres, numeric characters, right justified (convert feet to metres by multiplying by .3048).

e.g.

1	0	9	7	= 1097 m

Column 139

Erosion Potential: numeric. This describes the chance of water eroding down to or into the mineral soil layer and is based upon water flow, slope and soil type.

Code

1 = Slight – when 0 to 25% of the area is, or could be eroded in a flood situation.
2 = Moderate – when 25% to 75% of the area is, or could be eroded in a flood situation.
3 = High – when more than 75& of the area is, or could be eroded in a flood situation.

e.g.

2	= moderate erosion potential

Column 140

Drainage: numeric, for definitions of codes see Appendix 4.3 of the PSP Manual

Code

1 = Very rapidly drained
2 = Rapidly drained
3 = Well drained
4 = Moderately well drained
5 = Imperfectly drained
6 = Poorly drained
7 = Very poorly drained

e.g. 6 = poorly drained soil

Column 141-142
Depth to Mineral Soil: numeric, right justified, measured in cm or inches.

If greater than 99 cm, fill with 99. This will indicate a depth to mineral soil of 99 or greater.

e.g.

1	0	= 10cm

Column 143
Surface Vegetation-Type: numeric, nine possible types or combinations of grass, lichen/=moss, herbs (flowers and non-woody stems) and shrubs (woody stems). The dominant type is recorded.

Code

1 = grass
2 = grass + herbs
3 = grass + shrubs
4 = lichen/moss
5 = lichen/moss + herbs
6 = lichen/moss + shrubs
7 = herbs
8 = herbs + shrubs
9 = shrubs

e.g.

4	= lichen/moss

Column 144 -146
Surface Vegetation - % Ground Cover: numeric, right justified. Tally the percent of ground that is covered by surface vegetation type.

e.g.

	9	5	= 95% of ground covered by surface vegetation type

Column 147
Maintenance Report – Access: numeric (for definitions of Access codes see Appendix 4.8).

Code

1 = all weather road
2 = dry weather road
3 = deteriorating road
4 = all terrain vehicle
5 = helicopter
6 = unknown

Column 148
Plot Damage: numeric

1 = none
2 = natural damage
3 = manmade damage
4 = natural and manmade damage
5 = closed
6 = (this code is not used)
7 = plot was previously closed but has been reopened (office use only)

Column 149
Buffer Damage: numeric

1 = none
2 = natural damage
3 = manmade damage
4 = natural and manmade damage
5 = closed
6 = damage inside buffer greater than 20m from subplot
7 = plot was previously closed but has been reopened (office use only)

e.g. Comments: 2. (access) 1. (plot damage)
3. (buffer damage)

= dry weather road, none, manmade damage

Column 150-153
Establishment Year: numeric

e.g.

1	9	6	1	= 1961

Column 164
Plot Configuration

Column 180-183
Stand Origin

Column 184
Site Index/TPR: character

Column 185-186
Site Index/TPR: numeric

Column 187-190
Photo year

Column 191-198
Ecosite

Column 199-201
Aspect in Degrees

Column 202
Nutrient Regime

Column 203-204
Natural Region

Column 203-208
Minimum diameter Measured (mm)

Column 209-210
Stump Height (cm)

Column 211
Surface Expression

Column 212
Slope Position

d. Record 02 – Tree Information – header Sheet (Columns 1-37) – Tally Sheet (Columns 38-124)

Column 38-39
Record type: previously filled as 02

Column 40-43
Tree Number: numeric, right justified.

Tree numbers will be:

1. Consecutive i.e. 1 through 9997 (saplings included).
2. 0000 – representing a tree felled outside the plot to determine stump age and increments (pre-filled on Header Sheet).

e.g.

0	0	9	8	= tree #98

Column 44-45
Species: tree species, alpha characters

Code

FA = Alpine fir

FB = Balsam fir
FD = Douglas fir
LA = Alpine larch
LT = Tamarack
LW = Western larch
PF = Limber pine
PJ = Jack pine
PL = Lodgepole pine
PW = Whitebark pine
SB = Black spruce
SE = Englemann spruce
SW = White spruce
AW = Aspen
PB = Balsam poplar
BW = White birch
NO = Indicates No trees to tally in regeneration plot

e.g.

A	W	= Aspen

Column 46-49
DBH:. (Diameter at Breast Height), one decimal place, numeric, right justified. In the computer the format is in millimeters (No Decimal).

e.g.

	3	2	.1	= 32.1 cm dbh

Column 50-53
Height: (Tree Height), one decimal place, numeric, right justified. In the computer the format is in decimeters (No Decimal).

e.g.

	3	0	.6	= 30.6 m tree height

Column 54-57
Height to Live Crown: (Tree Height from base to point of first branch of the crown), one decimal place, numeric, right justified. In the computer the format is in decimeters (No Decimal).

e.g.

	1	0	.5	= 10.5 m from tree base to live crown

Column 58
C.C. (Crown Class), alpha character

Code

D	Dominant	-crowns extend above the general level of the canopy

C	Codominant	-crowns form the general level of the canopy
I	Intermediate	-crowns below but extending into the bottom of the general level of the canopy
S	Suppressed	- crowns entirely below the general level of the canopy
O	Open-grown	-if the trees branches does not interact with another trees branches.

e.g. S = suppressed tree

Column 59-64

Condition Codes: (Tree condition codes) numeric. If the tree has no defect, record 00. Zero filling is not required. ***See Master Condition Code List***

e.g.

5	1	5	4		

= tree with conks and a fork

e.g.

2	9				

= tree cut down

e.g.

6	3	5	6	6	6

= tree with a stem disease, broken and a stem form defect

If there is not visible defect, a condition code 00 is recorded.

The following columns 65-76 are on Header Sheet only (TM 267)

Column 65-67

DBH Age: (Tree DBH age), numeric characters, right justified, zero filled

e.g.

1	1	6

= 116 yrs of age at DBH (1.3 m)

Column 68-70

Stump Age: (Tree stump age), numeric characters, right justified, zero filled.

e.g.

1	2	1

= 121 yrs of age at stump (.3 m)

Column 71-76

Stump Increment Width: increment width for the last 20 yrs. growth done in 2 measurements: 0 – 10 yrs, 11-20 yrs, numeric characters, right justified, one decimal place, zero filled. Entered as mm in digital file.

e.g.

0	2	3	0	1	5

= 2.3 cm increment for 0 – 10 yrs
= 1.5 cm increment for 11 – 20 yrs

Column 77-79

Azimuth: azimuth of tree from plot center, numeric, right justified, 1 to 360^0

e.g.

0	2	0	= 20^0 from the plot centre

Column 80-82
Distance: distance of tree from plot center, numeric, right justified one decimal place. In the computer, the format is in decimeters (No Decimal).

e.g

0	6	.3	= 6.3 m from plot center

Column 83-89
Tree Plot size (m^2): numeric, right justified, go to one decimal place. Zero filled.
Tree Plot Size (m^2): numeric, right justified, go to one decimal place. Zero filled.

Column 97-103
Regen Plot Size (m^2)

Column 104-107
Establishment Year: numeric, right justified.

Column 108
Crown Status: "Y" indicates tree needs crown measurements. "Blank" indicates no crown measurement required.

Column 109-112
Crown Width North: recorded in decimeters (dm). Right justified.

Column 113-116
Crown Width West: recorded in decimeters (dm). Right justified.

Column 117-120
Crown Width West: recorded in decimeters (dm). Right justified.

Column 121-124
Crown Width East: recorded in decimeters (dm). Right justified.

e. Record 03 – Regen Information (Columns 38-85)

Column 38-39
Record Type: previously recorded as 03.

Column 40-43
Tree number: previously recorded as 9998.

Column 44-45
Species: tree species, alpha characters.

Column 40-48, 49-51, 52-54, 55-57, 58-60

Total (1-5): numeric, right justified, zero filled. Add in 3 plot sizes and establishment year from Page 41: numeric right justified, zero filled.

e.g.

0	0	2

= 2 regeneration of that species in that height class

Column 61-67

Tree Plot Size (m²): right justified.

e.g.

		1	0	0	0	.0

= 1,000.0 m²

Column 68-74

Sapling Plot Size (m²): right justified..

e.g.

			2	5	0	.0

= 250.0 m²

Column 75-81

Regen Plot Size (m²): right justified.

e.g.

				6	2	.0

= 62.0 m²

Column 81-85

Establishment Year: right justified.

e.g.

1	9	6	0

= 1960

f. Summary of Allowable Errors

Item	Allowable Error
Location of Plot Centre (Tie Point and Tie Line)	- 2% of the cruise line horizontal distance (e.g. 3m of a 150m tie line H.D.)
Plot Size (Sides) – Tree Plot	- 31.62 ± .25m (31.37 – 31.87m)
	38.73 ± .31m (38.72 – 39.04m)
	44.72 ± 0.36m (44.36 – 45.08m)
– Sapling/Regen Plot	- 7.90 ± .06m (7.84 – 7.96m)
	9.69 ± .08m (9.61 – 9.77m)
	11.09 ± .09m (11.09 – 11.27m)

Plot Size (bearings)	± 2°
No. of Trees Tallied and Species Identified	Tree plot - none
	Sapling plot - ±5% of total (e.g. 2- saplings±1) – no allowable error in identification
	Regen plot - ±10% (e.g. 20 regen ±2)
DBH	Diameter Breast height – 1.3m ± 6.5cm (±5%) diameter – ± 1.0 cm
Height and Height to Live Crown	±3% (e.g. 16.2m ± .5m)
Crown Class and Condition Codes	10% of stems tallied may have incorrect crown class or condition codes (e.g. 10 trees of 100 tallied)
Stem Mapping	Azimuth - ± 2°
	Distance - ± 0.5m
Section Lengths	± 5cm after "cookie" is cut
Perpendicular Cuts	± 10° from perpendicular
DHB and Stump Age	Conifers - ± 1 year
	Deciduous - ± 5 years
Increment Width	± 5% for each set of years

g. Plot Measurement Summary

Plot	Length of Side (m)	Area (ha)	Area (m^2)	Buffer Side (m)	Buffer Area ((m^2)
Tree	31.62	0.100	1,000	200	40,000
	38.73	0.150	1,500	237	56,250
	44.72	0.200	2,000	300	90,000
Sapling/Regen	7.90	0.006	62		
	9.69	0.009	94		
	11.18	0.012	125		

Plot	Stem Size	Tagged	Number Recorded
Tree	≥ 9.1 cm DBH	Yes	0001
			to 7999
Sapling	1.3 m in height	Yes	8001
Regen	≥ 0.10 height up to a height of <= 1.29 m	No	9998
Outside of Plot	Representatives of stand age	No	0000

h. *Rounding-Off*

The following rules are to be followed for rounding off height measurements on sample trees.

1) Delay rounding off numbers as long as possible, preferably to the last stage, as rounding can significantly affect the accuracy of the final answer.

2) If the digit to be rounded is followed by a digit greater than 5, round up.

e.g. 10.66 .... 10.7
16.394............ 16.4 (6, 9 & 7 are greater than 5)
21.17 .... 21.2

3) If the digit to be rounded is followed by a digit less than 5, leave as is.

e.g. 10.64 .... 10.6
10.339 .... 16.3 (4, 3 & 1 are less than 5)
21.11 .... 21.1

4) If the digit to be rounded is followed by a 5 then:

a) If the digits following the 5 are greater than 0, round up.

e.g. 10.651 .... 10.7
16.359 .... 16.4
21.154 .... 21.2

b) If the digit being rounded is followed by a 5 and no other digits then:

i) If the digit being rounded is odd, round up.
10.55 .... 10.6
16.35 .... 16.4
21.15 .... 21.2

ii) If the digit being rounded is even, leave as is.
10.65 .... 10.6
16.45 .... 16.4
21.25 .... 21.2
25.5 ....25.0

NOTE: The number 0 is considered to be an even number.

10. MISTLETOE AND IMMATURE PLOT TYPES

In September 1989 two new plot types were introduced:

i) 600 – mistletoe plot type

ii) 700 - immature plot type (16 - 55 years old)

iii) The mistletoe plot type is established and re-measured according to the procedures outlines in Section 2.0. The severity of the mistletoe on the infected stem(s) is recorded using the 6 digit Hawksworth Mistletoe Rating System (see Figure 4.12 for rating system). Trees are sectioned in accordance with the A.F.S. Tree Sectioning Procedures Manual (see also Section 2.1.4.7).

Starting in 2000 field season in the immature plot, we do not have a minimum DBH requirement. All trees ≥ 1.3m in height will be tagged and measured in the 1/16 sapling/regen plot.

iv) In the remainder of the plot, all trees ≥ 9.1cm at DBH are numbered and measured. Diameters, crown class and condition codes are assigned to each tree stem. Heights are measured according to procedures outlined in Section 2.1.4.4. All tagged trees are stem mapped.

NOTE: On the stems that are too small to withstand a nail, DBH is marked with a blue painted band so that future measurements are taken at the same point. A numbered tree tag is then placed loosely around the stem or a branch so as to prevent girdling of the stem Seedling calipers or a baltimore stick is used to take sapling diameters.

When sectioning the immature plots three representative trees within the buffer are cut. When bucking, use 1.0m section lengths.

In very dense stands, trees on the boundary of the tree plot, but not in the plot can have a yellow or orange vertical strip painted on them, facing into the tree plot. This will assist future re-measurements crews in determining border line trees.

11. ASCII FORMAT OF PSP TREE DATA, RECORDS 1, 2 AND 3

STANDARD SAMPLE PLOT FILE FORMATS
KEYPUNCH AND MASTER FILES
(Format as of February, 2000)

There are 4 record types found in these standard sample plot files:

a) Plot Header records (Type 01)
b) Tree description Records (Type 02)
c) Regeneration Records (Type 03)
d) GPS Records (Type 04)
e) Detail of Plot Treatment (Type 05)

All numeric variables are right justified and character variables are left justified.

Variable's abbreviated name is located before the variable description.

Record types are identified by a 2 digit code found in columns 38-39. A list of variables found in each record type is described below:

There are 15 different plot types and are as follows: Please advise FMD if plot type is not on list and put plot type in next available 2 digit position. Zero filled:

Ptype: plot type

1.) PSP Regular
2.) PSP Stand Dynamics Survey
3.) PSP Reforestation Monitor Plot
4.) TSP Operational Cruise
5.) TSP Inventory
6.) TSP Large Scale Photography
7.) Mistletoe
8.) Thinned
9.) Fertilized
10.) Herbicide
11.) Pruned
12.) Spruce Budworn
13.) Cleaned
14.) Thinned and Fertilized
15.) Herbicide and Thinned

There are 3 different plot configuration types and are as follows: Please advise FMD if plot configuration is not on list and put plot configuration in next available position.

Pconfig: plot configuration

Fixed area (Any shape)	- 1
Fixed area subplot	- 2
Variable radius (Prism) plot	- 3

There are 34 different Agency codes but this can be expanded. Please advise FMD if agency is not on list and put agency in next available 2-digit position. Zero filled. List is as follows:

Agency

01 – Alberta Forest Service	02 – B.C. Forest Service
03 – Saskatchewan Forest Service	04 – Pedology Consulting
05 – B.C. Forest Products.	06 – Proctor and Gambler
07 – Champion Forest Products	08 – Canfor (N.C.F.I)
09 – Ziedler Plywood Ltd.	10 – Makin Consulting
11 – Montreal Engineering	12 – Blue Ridge Lumber Co.
13 – Pelican – Spruce Sawmil	14– Special Projects
15 – University of Alberta	16 – Canadian Forest Service
17 – Alberta Newsprint	18 – Alpac
19 – Canadian Forest Products	20 – Daishowa-Marubeni International
21 – Manning Diversified Forest Products	22 – Millar Western
23 – Slave Lake Pulp Corp	24 – Spray Lake Sawmill
25 – Sundance	26 – Sunpine
27 – Tolko – High Prairie	28 – Tolko – High Level
29 – Vanderwell	30 – Weldwood
31 – Weyerhaeuser – Drayton Valley	32 – Weyerhaeuser - Edson
33 - Weyerhaeuser – Grande Prairie	34 – Weyerhaeuser – Saskatchewan
35 – Weyerhaeuser – Slave Lake	

There are 3 different measurement types (number) and are as follows:

Measure: measurement number

TSP Always = 0

PSP Establishment = 0

PSP Re-measurement = 1, 2, 3, etc.

In Record Type "01", subplot variable indicates if there is subplots within the plot. If "No" subplots (1 in record Type 1) then Subplot variable in other records left blank. Otherwise enter appropriate subplot number.

a. RECORD TYPE "01" – STANDARD SAMPLE PLOT HEADER RECORDS

Column		Description		ASCII Format
1-2		Ag: Agency		I2
3-12		Plot: Plot number		I10
13		Subplot: Subplot number (1 = No subplots and 2 = Subplots)		I1
14-15		Measure: Measurement number		I2
16-19		Year: Year of measurement		I4
20-21		Month: Month of measurement		I2
22-23		Day: Day of measurement		I2
24-25		LSD: Legal subdivision		I2
26-27		Sec: Section		I2
28-30		Twp: Township		I3
31-21		Rge: Range		I2
33		Mer: Meridian		I1
34-36		Ptreat: Plot treatment		I3
37		Imp: Imperial		A1
38-39		Recty: Record Type (Always '01')		I2
40-46		Plotsize: Plot size (m^2)		F7.1
47-53		Sapsize: Sapling Plot size (m^2)		F7.1
54-60		Regsize: Regen Plot size (m^2)		F7.1
61-71		Phase 1, 2 or 3 Overstorey		A11
61		Dense: Overstorey Density class		A1
62		Htphase: Overstorey Height class		I1
63-64		Spph1: Overstorey Species 1		A2
65-66		Spph1: Overstorey Species 2		A2
37-38		Spph1: Overstorey Species 3		A2
69-70		Brack: Overstorey Bracketed Species		A2
71		Com: Overstorey Stand Commercialism		A1
72-93		AVI Interpreted Overstorey		A22
72		Moistch: Moisture Regime (Alpha-small letter)		A1
73		Moistnu: Moisture Regime (Numeric)		I1
74		Crcch: Crown Closure Class (Alpha-cap letter)		A1
75		Crcnu: Crown Closure Class (Numeric)		I1
76-77		Htc: Height to closest metre		I2

78-79		Sp1: Species 1 (Capital + small)		A2
80-81		Per1: Species 1 Percent (10% classes)		I2
82-83		Sp2: Species 2 (Capital + small)		A2
84		Per2: Species 2 Percent (10% classes)		I1
85-86		Sp3: Species 3 (Capital + small)		A2
87		Per3: Species 3 Percent (10% classes)		I1
88-89		Sp4: Species 4 (Capital + small)		A2
90		Per4: Species 4 Percent (10% classes)		I1
91-92		Sp5: Species 5 (Capital + small)		A2
93		Per5: Species 5 Percent (10% classes)		I1
94-108		Phase 1, 2 or 3 Understorey		A15
94		Denseu: Understorey Density class		A1
95		Htphaseu: Understorey Height class		I1
96-97		Spph1u: Understorey Species 1		A2
98-99		Spph2u: Understorey Species 2		A2
100-101		Spph3u: Understorey Species 3		A2
102-103		Bracku: Understorey Bracketed		A2
104		Commu: Understorey Stand Commercialism		A1
105-108		Soringinu: Understorey Stand Origin		I4
109-128		AVI Interpreted Understorey		A20
109		Crcchu: Crown Closure Class (Alpha-cap letter)		A1
110		Crcchu: Crown Closure Class (Numeric)		I1
111-112		Hrcu: Height to closest metre		I2
113-114		Spu1: Species 1 (Capital + small)		A2
115-116		Peru1: Species 1 Percent (Capital + small)		I2
117-118		Spu2: Species 2 (Capital + small)		A2
119		Peru2: Species 2 Percent (Capital + small)		I1
120-121		Spu3: Species 3 (Capital + small)		A2
122		Peru3: Species 3 Percent (Capital + small)		I1
123-124		Spu4: Species 4 (Capital + small)		A2
125		Peru4: Species 4 Percent (Capital + small)		I1
126-127		Spu5: Species 5 (Capital + small)		A2
128		Peru5: Species 5 Percent (Capital + small)		I1
129		Locate: Location		I1
130-132		Slope: Slope percent		I3

133-134		Aspect: N, W, NE, NW, etc. NA= No Aspect		A2
135-138		Elev: Elevation (m)		I4
139		Eros: Erosion potential		I1
140		Drain: Drainage		I1
141-142		DMS: Depth to mineral soil (cm)		I2
143		SVT: Surface vegetation type		I1
144-146		Gnd: Ground cover percent		I3
147		Access		I1
148		Pldam: Plot damage		I1
149		Budam: Buffer damage		I1
150-153		Estyr: Establishment Year		I4
162-163		Ptype: Plot Type		I2
164		Pconfig: Plot Configuration		I1
180-183		Storigin: Stand origin		I4
184		SIA: Site Index/TPR		A1
185-186		SII: Site Index/TPR		I2
187-190		Photo: Photo year		I4
191-193		Struct: Stand Structure		A3
194-198		Ecosite		A5
199-201		AspDeg: Aspect in Degrees		I3
202		Nutri: Nutrient Regime		A1
203-204		Nregion: Natural region		I2
205-208		Mindbh: Minimum Diameter measured (mm)		I 4
209-210		Stumpht: Stump Height (cm)		I2
211		Surf: Surface Expression		A1
212		Slopepos: Slope Position		A1

b. RECORD TYPE "02" – STANDARD TREE DESCRIPTION RECORD

Column		**Description**		**ASCII Format**
1-2		Ag: Agency		I2
3-12		Plot: Plot number		I10
13		LPSPSub: LFS PSP Subplot number		I1
14-15		Measure: Measurement number		I2
16-19		Year: Year of measurement		I4

20-21		Month: Month of measurement		I2
22-23		Day: Day of measurement		I2
24-25		LSD: Legal subdivision		I2
26-27		Sec: Section		I2
28-30		Twp: Township		I23
31-32		Rge: Range		I2
33		Mer: Meridian		I1
34-36		Ptreat: Plot treatment		I3
37		Imp: Imperial		A1
38-39		Recty: Record Type (Always '02')		I
40-43		Tree: Tree number		I
44-45		Sp: Species (Caps)		A2
On No Tally Plots Enter Tree = 0001 and Sp= NO)				
46-49		Dbh: Diameter Breast Height (mm)		I4
50-53		Ht: Height (dm)		I4
54-57		Htlcrn: Height to live crown (dm)		I4
58		Cclass: Crown Class		A1
59-60		Cond1: Condition Code 1		I2
61-62		Cond2:Condition Code 2		I2
63-64		Cond3:Condition Code 3		I2
65-67		Dbhage: Diameter Breast Age		I3
68-70		Stumpage: Stump Age		I3
71-73		Inc10: Increment Prev. 10 yrs (mm)		I4
74-76		Inc20: Increment Prev. 11-20 yrs (mm)		I4
77-79		Azimuth		I3
80-82		Distance (dm)		I3
83-89		Plotsize: Plot/subplot size (m^2)		F7.1
90-96		Sapsize: Sapling Plot size (m^2)		F7.1
97-103		Regsize: Regen Plot size (m^2)		F7.1
104-107		Estyr: Establishment year		I4
108		Crstat: Crown status		A1
109-112		Crn: Crown Width North (dm)		I4

113-116		Crw: Crown Width West (dm)		I4
117-120		Crs: Crown Width South (dm)		I4
121-124		Cre: Crown Width East (dm)		I4
125-126		Subplot: Subplot number		I2
127-141		Stand: Stand/Polygon number		I15
142-146		Stump: Stump Diameter (mm)		I5

c. RECORD TYPE "03" – STANDARD REGENERATION RECORD

Column		Description		ASCII Format
1-2		Ag: Agency		I2
3-12		Plot: Plot number		I10
13		LPSPSub: LFS PSP Subplot number		I1
14-15		Measure: Measurement number		I2
16-19		Year: Year of measurement		I4
20-21		Month: Month of measurement		I2
22-23		Day: Day of measurement		I2
24-25		LSD: Legal subdivision		I2
26-27		Sec: Section		I2
28-30		Twp: Township		I3
31-32		Rge: Range		I4
33		Mer: Meridian		I1
34-36		Ptreat: Plot treatment		I3
37		Imp: Imperial		A1
38-39		Recty: Record Type (Always '03')		I2
40-43		Tree: Tree number		I4
44-45		Sp: Species (Caps)		A2
(On No Tally Plots Enter Sp=NO)				
46-48		Regen 1: Regeneration in height class 1		I3
49-51		Regen 2: Regeneration in height class 2		I3
52-54		Regen 3: Regeneration in height class 3		I3
55-57		Regen 4: Regeneration in height class 4		I3
58-60		Regen 5: Regeneration in height class 5		I3

61-67		Plotsize: Plot size (m^2)		F7.1
68-74		Sapsize: Sapling Plot size (m^2)		F7.1
75-81		Regsize: Regen Plot size (m^2)		F7.1
82-85		Estyr: Establishment Year		I4
86-87		Subplot: Subplot number		I2

d. RECORD TYPE '04' – STANDARD GPS RECORDS

Column		Description		ASCII Format
1-2		Ag; Agency		I2
3-12		Plot: Plot number		I10
13-14		Sec: Section		I2
15-17		Twp: Township		I3
18-19		Rge: Range		I2
20		Mer: Meridian		I1
21-22		Subplot: Subplot number		I2
23-37		Stand: Stand/Polygon number		I15
38-39		Reacty: Record Type (Always '04')		I2
40-44		Declong: Longitude Dec. Degrees		F15.10
45-59		Declat: Latitude Dec. Degrees		F15.10
60-70		Easting		F11.5
71-81		Northing		F11.5
82-85		UTM		I4
86-87		NAD (Preferable 83)		I2

e. DETAIL OF PLOT TREATMENT (TYPE 05) - On progress

12. TREE SPECIES CODE

Only the following species will be measured:

Common Name Genus/Species	Scientific Name Code	Species
Fir	Abies	
Alpine fir	A. lasiocarpa	FA
Balsam fir	A. balsamea	FB
Birch	Betula	
White birch	B. papyrifera	BW
Douglas-fir	Pseudotsuga	
Douglas-fir	P. menziesii	FD
Larch	Larix	
Alpine larch	L. lyalii	LA
Tamarack	L. laricina	LT
Western larch	L. occidentalis	LW
Pine	Pinus	
Limber pine	P. flexilis	PF
Jack pine	P. banksiana	PJ
Lodgepole pine	P. contorta	PL
Whitebark pine	P. albicaulis	PW
Poplar	Poplus	
Aspen (White Poplar)	P. tremuloides	AW
Balsam poplar (Black poplar)	P. balsamifera	PB
Spruce	Picea	
Black spruce	P. mariana	SB
Englemann spruce	P. englemannii	SE
White spruce	P. glauca	SW

13. PLANT SPECIES CODE

TREE LAYER

Species Code	Latin Name	Common Name
ABIE BAL	Abies balsamifera	Balsam Fir
ABIE LAS	Abies lasiocarpa	Alpine Fir
BETU PAP	Betula papyrifera	White Birch
DC		Dead conifer
DD		Dead Deciduous
LARI OCC	Larix occidentalis	Western Larch
LARI LAR	Larix laricina	Larch
LARI LYA	Larix lyallii	Alpine Larch
PICE MAR	Picea mariana	Black Spruce
PICE GLA	Picea glauca	White Spruce
PICE ENG	Picea engelmannii	Engleman Spruce
PINU CON	Pinus contorta	Lodgepole Pine
PINU FLE	Pinus flexilis	Limber Pine
PINU ALB	Pinus albicaulis	Whitebark Pine
POPU BAL	Populus balsamifera	Balsam Poplar
POPU TRE	Populus tremuloides	Aspen
PSEU MEN	Pseudotsuga menziesii	Douglas Fir

SHRUB LAYER

Species Code	Latin Name	Common Name
ARCT UVA	Arctostaphyios uvaursi	Bearberry, Kinnickkinnick
ALNU CRI	Alnus crispa	Green Alder
ALNU TEN	*Alnus tenuifolia*	River Alder
AMEL ALN	Amelanchier alnifolia	Saskatoon Berry
BERB REP	*Berberis repens*	Creeping Mahonia
BETU GLA	Betula glandulosa	Dwarf Birch
BETU PUM	Betula pumila v. glandulifera	Swamp Birch
BETU OCC	*Betula occidentalis*	Water Birch
CHIM UMP	*Chimaphila umbellata*	Prince's Pine
CLEM OCC	*Clematis occidentalis*	Purple clematis
CORN STO	Cornus stolonifera	Red Osier Dogwood
CORY COR	*Corylus cornuta*	Beaked Hazelnut
GAUL HIS	*Gaultheria hispidula*	Creeping Snowberry
JUNI COM	Juniperus communis	Ground Juniper
JUNI HOR	Juniperus horizontalis	Creeping Juniper
LEDU GRO	Ledum groenlandicum	Labrador Tea
LINN BOR	Linnaea borealis	Twinflower
LONI DIO	Lonicera dioica v. glaucescens	Twining honeysuckle

Species Code	Latin Name	Common Name
LONI INV	*Lonicera involucrata*	Bracted Honeysuckle
LONI UTA	Lonicera utahensis	Red Twinberry
MENZ FER	*Menziesia ferruginea*	MenziesiaPLO
HOR	*Oplopanax horridum*	Devil's Club
OXYC MIC	Oxycoccus microcarpus	Small Bog Cranberry
POTE FRU	Potentilla fruticosa	Shrubby Cinquefoil
POTE NOR	*Potentilla norvegica*	Rough Cinquefoil
PRUN PEN	*Prunus pensylvanica*	Pin Cherry
PRUN VIR	*Prunus virginiana*	Choke Cherry
PRUN SP	*Prunus species*	Cherry
RHOD ALB	*Rhododendron albiflorum*	White-flowered Rhododendron
RIBE GLA	*Ribes glandulosum*	Skunk Currant
RIBE HIR	Ribes hirtellum	Wild Gooseberry
RIBE HUD	*Ribes hudsoniaum*	Northern Black Currant
RIBE LAC	Ribes lacustre	Bristly Black Currant
RIBE OXY	Ribes oxyacanthoides	Wild Gooseberry
RIBE TRI	Ribes triste	Wild Red Currant
RIBES SP	*Ribes species*	
ROSA ACI	Rosa acicularis	Prickly Rose
ROSA SP	*Rosa species*	Rose
ROSA WOO	*Rosa woodsii*	Common Wild Rose
RUBU IDA	Rubus idaeus	Wild Red Raspberry
RUBU PAR	*Rubus parviflorus*	Thimble Berry
RUBU SP	*Rubus species*	Raspberry Species
SALI ATH	Salix athabascensis	Willow
SALI BAR	Salix barklayi	Barclay's Willow
SALI BEB	Salix bebbiana	Beaked Willow
SALI GLA	Salix glauca	Smooth Willow
SALI MYR	Salix myrtillifolia	Myrtle-leaved willow
SALI PED	Salix pedicellaris	Bog Willow
SALI PET	Salix petiolaris	Basket Willow
SALI PYR	Salix pyrifolia	Balsam Willow
SALI SCO	Salix scouleriana	Willow
SALI SP	Salix species	Willow
SAMB RAC	*Sambucus Racemosa*	Red Elderberry
SHEP CAN	Shepherdia canadensis	Canadian Buffaloberry
SORB SCO	Sorbus scopulina	Mountain Ash

Species Code	**Latin Name**	**Common Name**
SPIR BET	Spiraea betulifolia	Birch-leaved Spirea
SPIR DEN	Spiraea densiflora	Pink Meadowsweet
SPIR SP	*Spiraea species*	Meadowsweet
SYMP ALB	Symphoricarpos albus	Snowberry
SYMP OCC	*Symphoricarpos occidentalis*	Wolfberry
VACC CAE	Vaccinium caespitosum	Dwarf Bilberry
VACC MEM	*Vaccinium membranaceum*	Tall Bilberry
VACC MYR	Vaccinium myrtilloides	Blueberry
VACC MYT	Vaccinium myrtillus	Low Bilberry
VACC SCO	*Vaccinium scoparium*	Grouse-berry
VACC ULI	*Vaccinium ulignosum*	Bog Bilberry
VACC VIT	Vaccinium vitis-idaea v. minus	Bog Cranberry
VIBU EDU	Viburnum edule	Lowbush Cranberry
VIBU OPU	*Viburnum opulus*	High-bush Cranberry

GRASS LAYER

Species Code	**Latin Name**	**Common Name**
(POA species - Record 1st 3 letters of genus and 1st 4 letters of species)		
AGRO RIP	Agropyron riparium	Steambank Wheatgrass
AGRO SMI	Agropyron smitthi	Western Wheatgrass
AGRO SUB	Agropyron subsecundum Wheatgrass	Bearded
AGRO TRA	Agropyron trachycaulum	Slender Wheatgrass
ALOP AEQ	*Alopecurus aequalis*	Water Foxtail
AGRO SCA	*Agrostis Scabra*	Hair Bentgrass
AGRO SP	*Agropyron species*	
AVEN FAT	*Avena fatua*	Wild Oat
BROM CAR	*Bromus carinatus*	Brome
BROM INE	Bromus inermis	Awnless Brome
BROM CIL	*Bromus ciliatus*	Fringed Brome
BROM VUL	*Bromus vulgaris*	Columbia Brome
CALA CAN	Calamagrostis canadensis	Bluejoint Marsh Reed
CALA INE	Calamagrostis inexpansa	Northern Reed Grass
CALA NEG	Calamagrostis neglecta	Narrow, Plains Reed Grass
CALA PUR	Calamagrostis purpurascens	Purple Reed Grass
CALA RUM	*Calamgrostis rubescens*	Pinegrass
CARE AQU	Carex aquatilis	Water Sedge
CARE BEB	Carex bebbi	Sedge

Species Code	Latin Name	Common Name
CARE BRU	Carex brunnescens	Brownish Sedge
CARE CON	Carex concinna	Beautiful Sedge
CARE DIS	Carex disperma	Two-seeded Sedge
CARE FOE	Carex foenea	Sedge
CARE GYN	Carex gynocrates	Northern Bog Sedge
CARE HOU	*Carex houghtoniana*	Carex
CARE LAS	Carex lasiocarpa	Hairy-fruited Sedge
CARE LEP	Carex leptales	Bristle Stalked Sedge
CARE OBT	*Carex obtusata*	Blunt Sedge
CARE PRA	Carex praticola	Sedge
CARE RIC	Carex richardsonii	Richardson's Sedge
CARE ROS	Carex rostrata	Beaked Sedge
CARE SP	Carex species	Carex Species
CARE UMB	Carex umbellata	Umbellate Sedge
CARE VAG	Carex vaginata	Sheathed Sedge
CINN LAT	*Cinna latifolia*	*Drooping Wood Reed*
DANT PAR	Danthonid parryi	Parry's Oatgrass
DESC CAE	Deschampsia caespitosa	Tufted Hair Grass
DIST STR	*Distichlis stricta*	Salt Grass
ELYM INN	Elymus innovatus	Hairy Wild Rye
ELYM SP	*Elymus species*	Wild Rye
ERIO POL	*Eriophorum polystachion*	Cotton Grass
ERIO SP	*Eriophorum species*	Cotton Grass
FEST OCC	*Festuco occidentalis*	Western Fescue
FEST PRA	*Festuca pratensis*	Meadow Fescue
FEST RUB	Festuca rubra	Red Fescue
FEST SAX	Festuca saximontana	Sheet Fescue
FEST SCA	Festuca scabrella	Rough Fescue
FEST SP	Festuca species	Fescue Species
GYLYC STR	Glyceria striata	Fowl Manna Grass
GRASS SP		*Grass species*
HIER ALP	*Hierochloe Alpina*	Alpine Sweetgrass
HIER ODO	*Hierochloe odorata*	Common Sweetgrass
HORD JUB	*Hordeum jubatum*	Foxtale Barley
JUNC BAL	Juncus balticus	Wire Rush
KOEL CRI	Koeleria cristata	June Grass
LUZU PAR	Luzula parviflora	Small-flowered Woodrush
ORYZ ASP	Oryzopsis asperifolia	Mountain Rice Grass
ORYZ PUN	*Oryzopsis pungens*	Short-awned Rice Grass
PANI SP	*Panicum species*	Panic Grass
PHLE PRA	Phleum pratense	Timothy Grass

Species Code	**Latin Name**	**Common Name**
PHRA AUS	*Phragmites australis*	Reed
POA GLAU	Poa glauca	Bluegrass
POA INTE	Poa interior	Bluegrass
POA PALU	Poa palustris	Fowl Bluegrass
POA PRAT	Poa pratensis	Kentucky Bluegrass
POA SP	*Poa species*	
SCHI PUR	Schizachne purpurascens	False Melic
TRIS SPI	Trisetum spicatum	Spike Trisetum
XERO TEN	*Xerophyllum tenax*	Bear Grass

HERB LAYER

Species Code	**Latin Name**	**Common Name**
ANAP MAR	*Anaphalis margaritacea*	Pearly Everlasting
ACHI MIL	Achillea millefolium	Common Yarrow
ACHI SIB	*Achillea sibirica*	Yarrow
ACHI SP	*Achillea species*	Yarrow Species
ACTA RUB	Actaea rubra	Red Baneberry
AGOS GLA	Agoseris glauca	Pale False Dandelion
AGOS SP	*Agoseris species*	False Dandelion
ALLI CER	Allium cernum	Nodding Onion
ANEM MUL	Anemone multifida	Windflower, Cutleaf Anemone
ANTE MIC	*Antennaria microphylla*	Rossy Pussytoes
ANTE SP	*Antennaria species*	
ANTE NEG	Antennaria neglecta	
ANTE PUL	Antennaria pulcherrima	Showy Everlasting
ANTE RAC	Antennaria racemosa	Racemose Everlasting
ANTE ROS	Antennaria rosea	Rosy Everlasting
APOC AND	Apocynum androsaemifolium	Spreading Dogbane
AQUI BRE	Aquilegia brevistyla	Blue Columbine
AQUI FLA	*Aquilegia flavescens*	Yellow Columbine
ARAL NUD	Aralia nudicaulis	Wild Sarasparilla
ARCE AME	Arceuthobium americanum	Dwarf Mistletoe
ARNI CHA	Arnica chamissonis	Leafy Arnica
ARNI COR	Arnica cordifolia	Heart-leaved Arnica
ARNI LAT	*Arnica latifolia*	Mountain Arnica
ARNI LON	Arnica longifolia	Long-leaved Arnica
ARNI SP	*Arnica species*	Arnica
ASTR SP	*Astragalus species*	Milk Vetch
ARTE CAM	Artemisia campestris	Plains Wormwood
ARTE FRI	Artemisia frigida v. americanus	Pasture Sage

Species Code	Latin Name	Common Name
ASTE CIL	Aster ciliolatus	Lindley's Aster
ASTE CON	Aster conspicuous	Showy Aster
ASTE FOL	Aster folicaeus	Aster
ASTE JUN	Aster junciformis	Rush Aster
ASTE LAE	Aster laevis	Smooth Aster
ASTE SP	Aster species	Aster species
ASTR ALP	Astragalus alpinus	Alpine Milk Vetch
ASTR EUC	Astragalus eucosmus	Milk Vetch
ASTR FRI	Astragalus frigidus	American Milk Vetch
ASTR STR	Astragalus striatus	Ascending Purple Milk Vetch
BOTR VIR	*Botrychium virginianum*	Grape Fern
CALY BUL	Calypso bulbosa	Venus' Slipper
CAMP ROT	Campanula rotundifolia	Bluebell, Harebell
CAST MIN	Castilleja miniata	Red Indian Paintbrush
CAST PAR	*Catilleja parviflora*	Small Flowered Paintbrush
CAST SP	Castilleja species	Paintbrush
CERA ARV	Cerastium arvense	Field Chickweed
CERA SP	Cerastium species	Chickweed species
CHRY IOW	Chrysoplenium iowense	Golden Saxifrage
CHRY LEU	*Chrysanthemum leucanthemum*	Ox-eye Daisy
CICU MAC	*Cicuta maculata*	Water Hemlock
CIRS ARV	*Cirsium arvense*	Canada Thistle
CIRS HOO	*Cirsium hookerianum*	White Thistle
CIRS SP	*Cirsium species*	Thistle Species
CIRS VUL	*Cirsium vulgare*	Bull Thistle
CORA MAC	*Corallorhiza maculata*	Spotted Coralroot
CORA TRI	Corallorhiza trifida	Pale Coralroot
CORN CAN	*Corn canadensis*	Bunch Berry
CORY AUR	Corydalis aurea	Yellow Corydalis
CORY SEM	Corydalis sempervirens	Pink/Pale Corydalis
CORY SP	*Corydalis species*	Corydalis
CREP SP	*Crepis species*	Hawksbeard species
CREP TEC	*Crepis tectorum*	Annual Hawksbeard
CYST FRA	Cystopteris fragilis	Bladder Fern
DELP GLA	Delphinium glaucum	Tall Larkspur
DISP TRA	Disporum trachyearpum	Fairy-bells
DODE RAD	Dodecatheon radicatum	Shooting Star
DRAB AUR	Draba aurea	Golden Whitlow-Grass
DRYO CRI	*Dryopteris cristata*	Fern
DRYO EXP	*Dryopteris expansa*	Spiny Woodfern
DRYO SP	*Dryopteris species*	Fern
DRYO SPI	Dryopteris spinulosa	Narrow Spinulose Shield Fern
ERIG GLA	*Erigeron glabellus*	Wild Daisy

Species Code	Latin Name	Common Name
EPIL ANG	Epilobium angustifolium	Fireweed
EQUI ARV	Equisetum arvense	Field Horsetail
EQUI PRA	Equisetum pratense	Meadow Horsetail
EQUI SCI	Equisetum scirpoides	Dwarf Scouring Rush
EQUI SP	*Equisetum species*	Horsetail Species
EQUI SYL	Equisetum sylvaticum	Woodland Horsetail
EQUI VAR	Equisetum variegatum	Variegated Horsetail
ERIG PER	Erigeron peregrinus v. callianthemus	Wondering Daisy
ERIG SP	Erigeron species	Fleabane
FRAG VIR	Fragaria virginiana	Wild Strawberry
GAIL ARI	Gaillardia aristata	Gaillardia
GALE TET	*Galeopsis tetrahit*	Hemp Nettle
GALI BOR	Galium boreale	Northern Bedstraw
GALI TRI	Galium triflorum	Sweet-Scented Bedstraw
GENT AMA	Gentianella amarella	Felwort, Northern Gentian
GENT SP	*Gentianella species*	Gentian species
GEOC LIV	Geocaulon lividum	Bastard Toadflax
GERA RIC	Geranium richardsonii	Richardson Geranium
GERA SP	*Geranium species*	Geranium
GERA VIS	*Geranium viscosissimum*	Sticky purple geranium
GEUM ALE	Geum aleppicum	Yellow Avens
GEUM MAC	Geum macrophyllum	Yellow Avens
GEUM RIV	Geum rivale	Purple or Water Avens
GEUM TRI	Geum triflorum	Old Man's Whiskers
GOOD REP	Goodyera repens	Rattlesnake Plantain
GYMN DRY	Gymnocarpium dryopteris	Oak Fern
HABE HYP	Habenaria hyperborea	Northern Green Orchid
HABE OBT	Habenaria obtusata	Blunt-leaved Orchid
HABE ORB	Habenaria orbiculata	Round-leaved Orchid
HABE VIR	Habenaria viridis v. bracteata	Bracted Orchid
HALE DEF	Halenia deflexa	Spurred Gentian
HEDY ALP	Hedysarum alpinum v. americanum	American Hedysarum
HEDY SP	*Hedysarum species*	Hedysarum
HERA LAN	Heracleum lanatum	Cow Parsnip
HIER ALB	*Hieracium albiflorum*	White hawkweed
HIER CAN	Hieracium canadense	Canada Hawkweed

Species Code	Latin Name	Common Name
HIER SP	*Hieracium species*	Hawkweed species
HIER UMB	Hieracium umbellatum	Narrow-leaved
	Hawkweed	
LATH OCH	Lathyrus ochroleucus	Cream-coloured
	Vetchlin	
LATH VEN	*Lathyrus venosus*	Peavine
LILI PHI	Lilium philadelphicum	Western Wood Lily
LINU LEW	Linum lewisii	Wild Blue Flax
LIST BOR	Listera borealis	Western Twayblade
LIST COR	Listera cordata	Heart-leaved Twayblade
LYCH DRU	Lychnis drummondii	Drummond's Cocle
LYCO ANN	Lycopodium annotinum	Stiff Club-Moss
LYCO COM	Lycopodium complanatum	Ground Cedar
LYCO SP	*Lycopodium species*	Club-moss
LUPI ARG	*Lupinus argenteus*	Perennia lupine
MAIA CAN	Maianthemum canadense	Wild Lily-of-the-Valley
MELI ALB	*Melilotus alba*	White sweet clover
MELI OFF	*Melilotus officinalis*	Yellow sweet clover
MERT PAN	Mertensia paniculata	Tall Mertensia, Lungwort
MITE NUD	Mitella nuda	Bishop's Cap, Mitrewort
ORCH ROT	Orchis rotundifolia	Round-leaved Orchid
ORTH SEC	*Orthilia secunda*	One-Sided Wintergreen
OSMO CHI	Osmorhiza chilensis	Blunt-fruited Sweet Cicely
OSMO DEP	Osmorhiza depauporata	Sweet Cicely
OXYT CAM	Oxytropis campestris	Late Yellow Locoweed
OXYT SER	Oxytropis sericeus v. spicata	Early Yellow Locoweed
OXYT SPL	*Oxytropis splendens*	showy loco-weed
PARN FIM	Parnassia fimbriata	Fringed Grass-of Parnas
PARN PAL	*Parnassia palustris*	Northern grass-of parnassus
PEDI BRA	*Pedicularis bracteosa*	Bracted lousewort
PEDI CAP	*Pedicularis capitata*	Few-flowered lousewort
PEDI GRO	Pedicularis groenlandicam	Elephant Head
PEDI LAB	Pedicularis labradoricam	Labrador Lousewort
PENS PRO	Penstemon procerus	Slender Blue Beardtongue
PETA PAL	Petasites palmatus	Palmate-leaved Coltsfoot
PETA SAG	Petasites sagittatus	Arrow-leaved Coltsfoot

Species Code	Latin Name	Common Name
PICR ECH	*Picris echioides*	Bristly ox-tongue
PLAN MAJ	*Plantago major*	common plantain
POLY BIS	Polygonum bistortoides	Western Bistort
POLY CAE	Polygonum caeruleum spp. occidentale	Jacob's Ladder
POLY VIV	Polygonum viviparum	Alpine Bistort
POTE ARG	Potentilla arguta	White Cinquefoil
POTE GLA	Potentilla glandulosa spp. pseudorupestris	Cinquefoil
POTE GRA	Potentilla gracilis	Graceful Cinquefoil
PYRO ASA	Pyrola asarifolia	Common Pink Wintergreen
PYRO BRA	*Pyrola bracteata*	Large wintergreen
PYRO CHL	*Pyrola chlorantha*	Green Wintergreen
PYRO ORB		
PYRO SP	Pyrola species	Wintergreen
RANU ACR	*Ranunculus acris*	Tall buttercup
RHIN CRI	Rhinanthus cristagalli	Yellow Rattle
RHIN MIN	*Rhinanthus minor*	Yellow rattle
RUBU ARC	Rubus arcticus	Dwarf Raspberry
RUBU PED	*Rubus pedatus*	Five-leaved bramble
RUBU PUB	Rubus pubescens	Dewberry
RUBU SP	*Rubus species*	
RUME ACE	*Rumex acetosa*	Green sorrel
RUME OCC	Rumex occidentalis v. fenestratus	Western Dock
SAXI BRO	Saxifraga bronchialis	Prickly Saxifrage
SCIR VAL	*Scirpus validus*	Common great bulrush
SCUT GAL	*Scutellaria galericulata*	Skullcap
SEDU STE	Sedum stenopetalum	Common Stonecap
SELA DEN	Selaginella densa	Prairie Selaginella
SENE CAN	Senecio canus	Prairie Groundsel
SENE PAU	Senecio pauperculus	Balsam Groundsel
SENE PSE	*Senecio pseudaureus*	Stream bank butterweed
SENE SP	*Senecio species*	Graundsel
SENE TRI	*Senecio triangularis*	Arrow-leaved groundsel
SMIL RAC	*Smilacina racemosa*	False Solomon's Seal
SMIL STE	Smilacina stellata	Star-flowered Solomon Seal
SMIL TRI	Smilacina trifolia	Three-leaved Solomon Seal
SOLI CAN	*Solidago canadensis*	Canada goldenrod
SOLI GIG	*Solidago gigantea*	Goldenrod
SOLI MUL	Solidago multiradiata	Alpine Goldenrod

Species Code	**Latin Name**	**Common Name**
SOLI SP	*Solidago species*	Goldenrod species
SOLI SPA	*Solidago spathulata*	Spike Like Golden Rod
SONC ARV	*Sonchus arvensis*	Perennial sow thistle
SONC SP	*Sonchus species*	Sow thistle
SPIR ROM	Spiranthes romanzoffiana	Ladies' Tresses
STEL CAL	*Stellaria calycantha*	Northern starwort
STEL LON	Stellaria longifolia	Long-leaved Chickweed
STEL SP	*Stellaria species*	Starwort species
STEN OCC	Stenanthium occidentale	Bronze Bells
STRE AMP	Streptopus amplexifolius	Twisted Stalk
TANA VUL	*Tanacetum vulgare*	Common tansy
TARA CER	*Taraxacum ceratophrum*	Horned Dandelion
TARA OFF	Taraxacum officinale	Common Dandelion
TARA SP	*Taraxacum species*	
THAL VEN	Thalictrum venulosum	Veiny Meadow Rue
THER RHO	*Thermopsis rhombifolia*	Golden bean
TRIF AUR	*Trifolium aureum*	Hop clover
TRIF PRA	*Trifolium pratense*	Red Cover
TRIF REP	Trifolium repens	White Clover
TRIF SP	*Trifolium species*	Clover Species
THPH LAT	*Typha latifolia*	Cattail
URTI DIO	*Urtica dioica*	Common nettler
VERA ESC	*Veratrum eschscholtzii*	False hellebore
VERO SP	*Veronica species*	
VERO WOR	*Veronica wormskioldii*	Alpine Speedwell
VICI AME	Vicia americana	Wild Vetch
VIOL ADU	Viola adunca	Early Blue Violet
VIOL CAN	*Viola canadensis*	Canada Violet
VIOL REN	Viola renifolia	Kidney-leaved Violet
VIOL RUG	Viola rugulosa	Western Canada Violet
VIOL SP	*Viola species*	Violet
ZIZI APT	Zizia aptera	Meadow Parsnip
ZYGA ELE	Zygadenus elegans	Death Camas

MOSSES AND LIVERWORTS

Species Code	Latin Name	Common Name
AMBL SER	Amblystegium serpens	
ANAS HEL	Anastrophyllum helleranum	
AULA PAL	Aulacomnium palustre	Glow Moss
AULA SP	*Aulacomnium species*	
BARB HAT	Barbilophozia hatcheri	Liverwort
BRAC OED	*Brachythecium Oedipum*	Short-leaved Ragged Moss
BRAC SAL	Brachythecium salebrosum	
BRAC STA	Brachythecium starkei	
BRAC TUR	Brachythecium turgidum	
BRYU CAE	Bryum caespiticium	
BRYU PSE	Bryum pseudotriquetrum	
CALL GIG	Calliergon giganteum	
CALY SPH	Calypogeja sphagnicola	
CAMP CHR	Campylium chrysophyllum	
CAMP HIS	Campylium hispidulum	
CAMP STE	Campylium stellatum	
CEPH LUN	Cephalozia lunufifolia	
CERA PUR	Ceratodon purpureus	Fire Moss
CLAD BAC	*Cladonia bacillaris*	
CLIM DEN	Climacium dendroides	
DICR ACU	Dicranum acutifolium	
DICR CON	Dicranum condensatum	
DICR ELO	Dicranum elongatum	
DICR FLA	Dicranum flagellare	
DICR FRA	Dicranum fragilifolium	
DICR FUS	Dicranum fuscenscens	
DICR GRO	Dicranum groenlandicum	
DICR MUE	Dicranum muehlenbeckii v.cirratum	
DICR POL	Dicranum polysetum	
DICR SCO	Dicranum scoparium	
DICR SP	Dicranum species	
DICR UND	Dicranum undulatum	
DIST CAP	Distichium capillaceum	
DREP ADU	Drepanocladus aduncus	
DREP REV	Drepanocladus revolvens	
DREP UNC	Drepanocladus uncinatus	
DREP VER	Drepanocladus vernicosus	
EURH PUL	Eurhynchium pulchellum	
FUNA HYG	Funaria hygrometrica	
GEOC GRA	Geocalyz graveolans	
HEDW CIL	Hedwigia ciliate	

Species Code	Latin Name	Common Name
HYLO SP	*Hylocomium species*	
HYLO SPL	Hylocomium splendens	Stair Step Moss
HYPN PRA	Hypnum pratense	
HYPN REV	Hypnum revolutum	
JAME AUT	Jamesoniella autumnalis	
LEPI REP	Lepidozia reptans	
LEPT PYR	Leptobryum pyriforme	
LOPH GUT	Lophozia guttulata	
LOPH INC	Lophozia incisa	
LOPH LON	Lophozia longidens	
LOPH VEN	Lophozia ventricosa	
MNIU SP	*Mnium species*	
MNIU SPI	Mnium spinulosum	
MYLI ANO	Mylia anomala	
MYUR JUL	Myurella julacea	
ONCO WAH	Oncophorus wahlenbergii	
ORTH RUP	Orthotrichum rupestre	
ORTH SPE	Orthotrichum speciosum	
PLAG ASP	Plagiochila asplenoides	
PLAG CUS	Plagiomnium cuspidatum	
PLAG DRU	Plagiomnium drummondii	
PLAG MED	Plagiomnium medium	
PLEU SCH	Pleurozium schreberi	
POHL NUT	Pohlia nutans	
POLY	ALP*Polytrichum Alpinum*	Stiff-leaved Polytrichum
POLY COM	Polytrichum commune	
POLY JUN	Polytrichum juniperinum	
POLY SP	*Polytrichum Species*	
POLY STR	Polytrichum strictum	
PTIL CIL	Ptilium ciliare	
PTIL CRI	Ptilium crista-castrensis	Knight's Plume
PTIL PUL	Ptilium pulcherrimum	
PYLA POL	Pylaisiella polyantha	
RHIZ PSE	Rhizomnium pseudopunctatum	
RHYT RUG	Rhytidium rugosum	
SPHA ANG	Sphagnum angustifolium	
SPHA CAP	*Sphagnum capillaceum*	Common red sphagnum
SPHA FUS	Sphagnum fuscum	
SPHA SP	*Sphagnum Species*	
SPHA WAR	Sphagnum warnstorfii	
SPLA AMP	Splachnum ampullaccum	
APLA SPH	Splachnum sphaericum	
TAYL SER	Tayloria serrata	

Species Code	Latin Name	Common Name
TETR ANG	*Tetraplodon angustatus*	
TETR MIN	*Tetraplodon minoides*	
TETR PEL	Tetrphis pellucida	
THUI ABI	Thuidium abietinum	
THUI REC	Thuidium recognitum	
TIMM AUS	Timmia austriaca	
TOME NIT	Tomenthypnum nitens	
TORT MUC	Tortula mucronifolia	
TORT RUR	Tortula ruralis	
TRIT EXS	*Tritomaria exsecta*	

LICHENS

Species Code	Latin Name	Common Name
BACI SPH	*Bacidian sphaeroides*	
BRYO FRE	Bryoria fremontii	
BRYO FUS	Bryoria fuscescens	
CETR CUC	Cetraria cucullata	
CETR ERI	Cetraria ericetorum	
CETR HAL	Cetraria halei	
CETR ISL	Cetraria islandica	
CETR NIV	Cetraria nivalis	
CETR PIN	Cetraria pinastri	
CLADI SP	*Cladina Species*	
CLAD BOT	Cladonia botrytes	
CLAD CAR	Cladonia carneola	
CLAD CEN	Cladonia cenotea	
CLAD CHL	Cladonia chlorophaea	
CLAD COC	Cladonia coccifera	
CLAD CON	Cladonia coniocraea	
CLAD COR	Cladonia cornuta	
CLAD DEF	Cladonia deformis	
CLAD ECM	Cladonia ecmocyna	
CLAD FIM	Cladonia fimbriata	
CLAD GRA	Cladonia gracilis	
CLAD MIT	Cladonia multiformis	
CLAD PLE	Cladonia pleurota	
CLAD PYX	Cladonia pyxidata	
CLAD RAN	Cladonia rangiferina	
CLAD SP	*Cladonia Species*	
EVER MES	Evernia mesomorpha	
HYPO BIT	Hypogymnia bitteri	

Species Code	**Latin Name**	**Common Name**
HYPO PHY	Hypogymnia physodes	
ICMA ERI	Icmadophila ericetorum	Spraypaint Lichen
LETH VUL	Letharia vulpina	
LOBA PUL	*Lobaria pulmonaria*	Lungwort
PARM ALE	Parmeliopsis aleurites	
PARM AMB	Parmeliopsis ambigua	
PARM HYP	Parmeliopsis hyperopta	
PARM SUL	Parmelia suleata	
PELT APH	Peltigera aphthosa	Green Dog Lichen
PELT CAN	Peltigera canina	
PELT MAL	Peltigera malacea	
PELT POL	Peltigera polydactyla	
PELT SP	*Peltigera species*	
PHYS ADS	Physicia adscendens	
PLAG SP	*Plagiomnium species*	Leafy moss
PLAT GLA	Platismatia glauca	
RAMA FAS	Ramalina fastigiata	
RAMA POL	Ramalina pollinaria	
STER TOM	Stereocaulon tomentosum	
USNE GLA	Usnea glabrescens	
USNE HIR	Usnea hirta	
USNE SOR	Usnea sorediifera	
USNE SUB	Usnea subfloridana	
USNE SP	Usnea species	
XANT POL	Xanthoria polycarpa	
XANT STR	Xanthoria	

14. COMMON PROBLEMS

Duplicate Tree Numbers

Try to determine the "oldest" tree and assume that is the initial tagged tree. If this can't be done, assume the tree with the largest DBH and/or height is the original tree. The condition and age of the tree tag may give a clue as to what tree was originally tagged as well. Number the other tree with the next available sequential number.

Past crews would also assign a sapling number to a seedling that has grown to 1.1cm DBH. If it is certain that 2 different numbers were used on the same stem, assume the tree is the one with the lower number (regen number).

In all cases fully document this in the comments column beside the appropriate tree(s).

Establishment crews would also rarely follow the proper initial numbering sequence in the regen plots. Use extreme care when measuring these plots.

15. RECORDING DATA

All measurements taken on these plots must be recorded on the appropriate tally sheets. Data entered on the sheets is later entered into a computer so legibility is very important. All header lines must be completed.

1) All letters must be capitalized.

2) Use only those species codes listed in Appendix 6.1 and 6.2.

3) Asterisks, numeric characters in alphabetic fields (e.g. B3 in the species columns) and alphabetic characters in numeric fields (e.g. H in DBH columns) are not acceptable.

4) Comments are written in the shaded areas only. Comments written elsewhere on the tally sheets are not acceptable.

5) Alphabetic characters that are commonly illegible are:

   N that looks like W
   C that looks like L or O
   D that looks like P or O
   I that looks like T or L

6) Numeric characters that are commonly illegible are:

   2 that is 'looped' and looks like 0
   6 and 9 that looks like 0 or 4
   0 incompletely closed and looks like 6
   5 that looks like S
   7 and 1 mistaken for each other
   Scientific (European) 7 is not acceptable

The number is written as open (i.e. four not 4).

16. GENERAL INFORMATION (CSTM 101)

Column	Name	Data Entry
1	Record Type	03 - cruise tally 04 - cruise vegetation 05 - plot vegetation 06 - regeneration (planted & natural) 61 - regen height class tallies 07 - sapling 08 - tree plot 09 - plot retreatment 1 record type per page.
3	Group Number	2 digits, right justified.
5	Plot Number	5 digits - zero fill, right justified.
8	Plot Type	Leave blank.
10	Year	Last 2 digits of year are recorded e.g. 1996 recorded as 96.
12	Month	Right justified, zero filled e.g. June is recorded as 06.
14	Day	Right justified zero filled. Note the date is the same on all tally sheets even if the plot took several days to remeasure with the exception of the vegetation tally sheet CSTM 102, which the actual date is recorded.
15	Crew Identification	Full crew names, initials are not acceptable e.g. John Smith, Mary Jones.
16	Regen Plot	Fill in the number of regeneration plot in which pinned seedlings are found. For planted seedlings outside the regen plots but within the pre 1993 sapling plot, code regen # as 5.

Column	Name	Data Entry
17	Tree Number	Fill in as required.
21	Species	Recorded as 2 capitalized letters as given in Appendix 6.1.
23	Diameter	Numeric, right justified, tree must be > 1.3 m tall to have diameter recorded. Measurements to nearest millimeter.
27	Height	Numeric right justified. Regen & sapling exclude current years growth and measure to nearest centimeter. Trees (>9.1cm DBH) - measure and record total height for all trees. Refer to Appendix 6.3
35	Crown Class	Crown class is recorded on trees and saplings as one letter (D, C, I, S or O). Refer to Appendix 6.9
36	Condition Codes	Left justified, recorded as a 2 digit number. Do not zero fill e.g. a leaning tree with conks is recorded as 51,58, blank. If a tree has no defect it is recorded as '00'. Refer to Appendix 6.5
42	Azimuth	Right justified, recorded as 1°-360°. Only 360° can be used, not 0°.
45	Distance	Right justified, measured to nearest decimeter on all saplings and trees (standing dead as well). Record declination in comments. Note that 2 stems cannot have identical azimuths and distances.

17. GENERAL INFORMATION (CSTM 100)

Columns	Refer to section 4.1
1-16	Refer to section 4.1
17	Species - recorded as 2 capitalized letters as given in Appendix 6.1
19-54	Height classes - recorded to nearest centimeter, excluding current years growth. Right justified, zero filled.

18. EXAMPLE OF A TIE PLATE

1. FOREST MANAGEMENT PROJECT

PERMANENT SAMPLE PLOT NO *456*

TIE POINT *'A' 75* M *C 180°* TO *P.C.*

LS.	SEC.	TWP.	RGE.	W.	MER.
1	*36*	*101*	*19*		*4*

FOR MORE INFORMATION CONTACT ALBERTA FOREST SERVICE

RANGER STATION AT *Fort McMurray*

OR FOREST MEASUREMENT AT 427-8474

Alberta
SUSTAINABLE RESOURCE
DEVELOPMENT

PSP MANUALS
MASTER
TABLE OF FIGURES

March 2005

Public Lands and Forests Division
Forest Management Branch
8th Fl. 9920-108 Street
Edmonton, AB
T5K 2M4

Phone: (780) 427 – 8474
Or visit the website: http://www3.gov.ab.ca/srd/forests/psp

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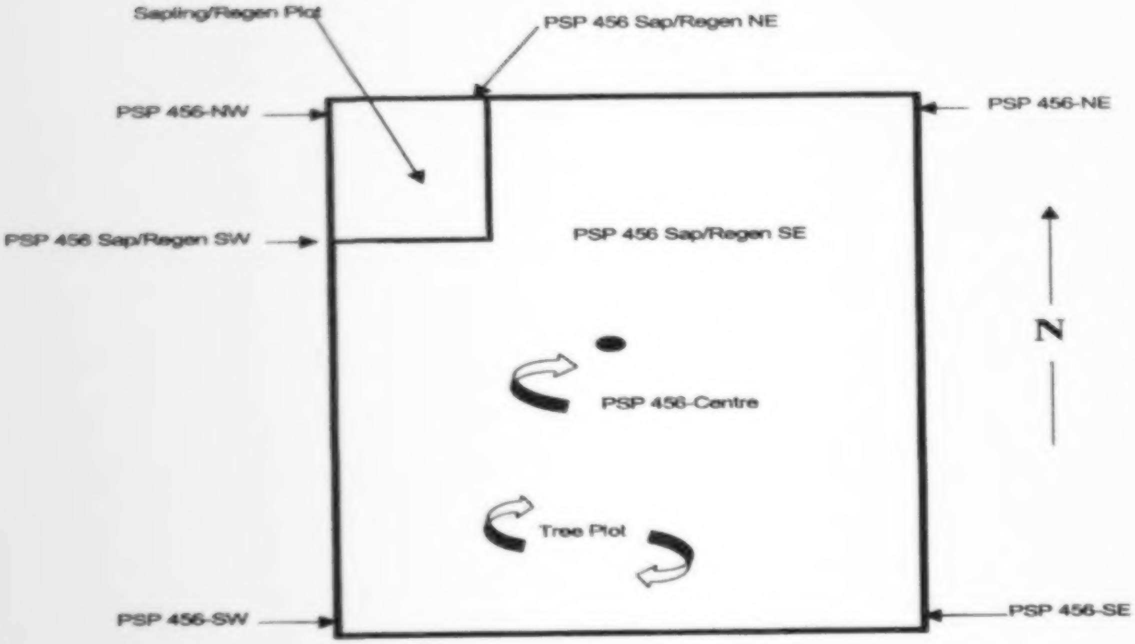

Sapling/Regen Plot
PSP 456 Sap/Regen NE
PSP 456-NW
PSP 456-NE
PSP 456 Sap/Regen SW
PSP 456 Sap/Regen SE
N
PSP 456-Centre
Tree Plot
PSP 456-SW
PSP 456-SE

FIGURE 2.1 PLOT LAYOUT

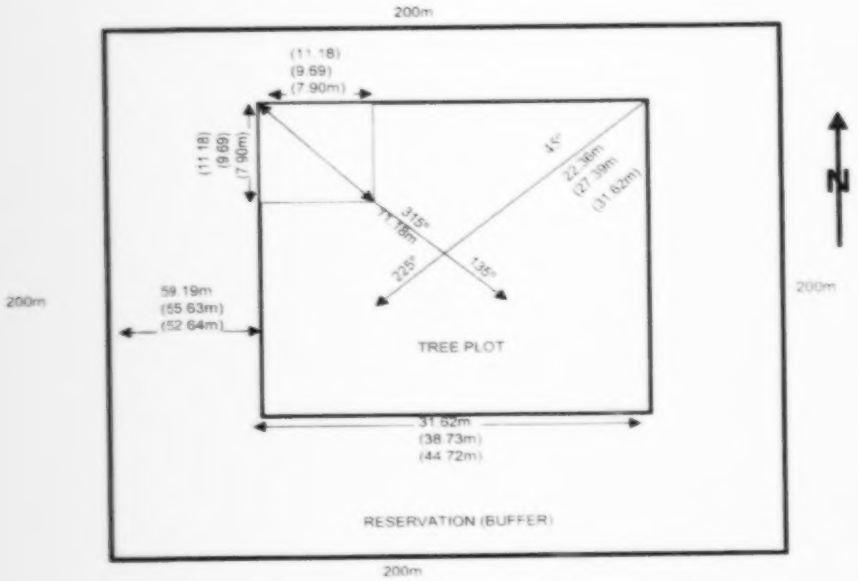

200m
(11.18)
(9.69)
(7.90m)
(11.18)
(9.69)
(7.90m)
45°
22.36m
(27.39m)
(31.62m)
315°
11.18m
225°
135°
N
200m
59.19m
(55.63m)
(52.64m)
200m
TREE PLOT
31.62m
(38.73m)
(44.72m)
RESERVATION (BUFFER)
200m

FIGURE 2.2 PLOT BOUNDARIES

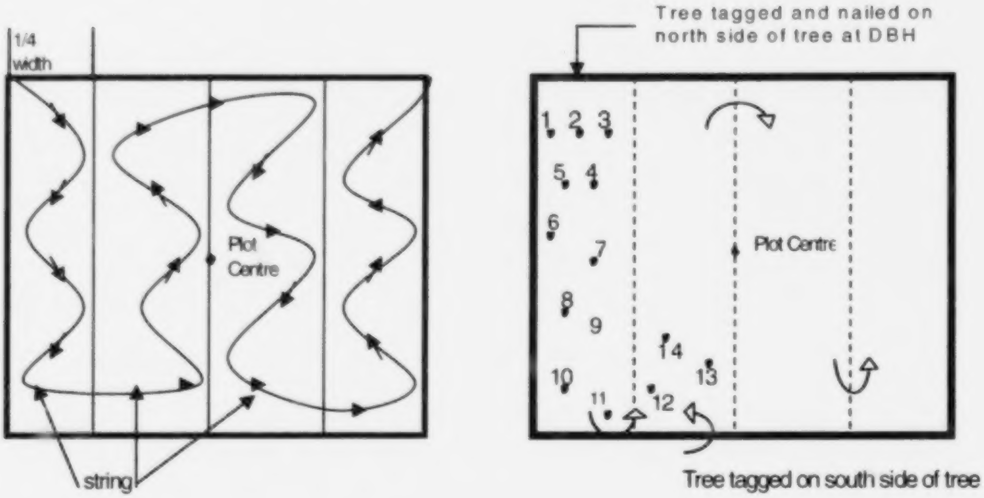

1/4 width
Plot Centre
string
Tree tagged and nailed on north side of tree at DBH
1
2
3
5
4
6
7
Plot Centre
8
9
14
13
10
11
12
Tree tagged on south side of tree

FIGURE 2.3 A SWATHS AND TAGGING ORDER

FIGURE 2.3B AN EXAMPLE OF NUMBERING ON TREE TAG

Trees forked below 1.3m are treated as two separate stems and are tagged and tallied as such.

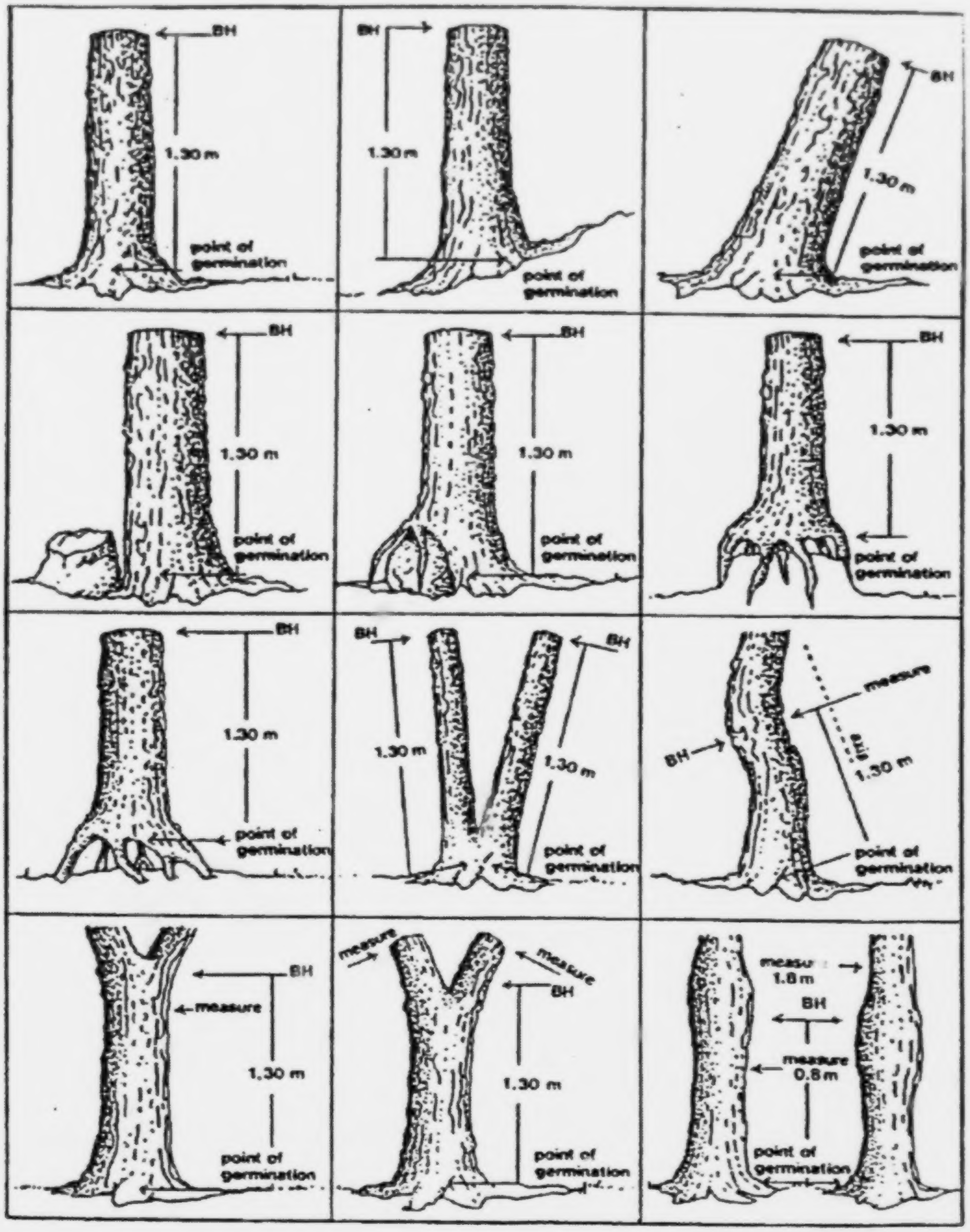

BH
1.30 m
point of germination
BH
1.30 m
point of germination
BH
1.30 m
point of germination
BH
1.30 m
point of germination
BH
1.30 m
point of germination
BH
1.30 m
point of germination
BH
1.30 m
point of germination
BH
1.30 m
BH
1.30 m
point of germination
measure
BH
1.30 m
point of germination
BH
measure
1.30 m
point of germination
measure
measure
BH
1.30 m
point of germination
measure 1.8 m
BH
measure 0.6 m
point of germination

FIGURE 2.4 DETERMINING POINT OF GERMINATION AND BREAST HEIGHT

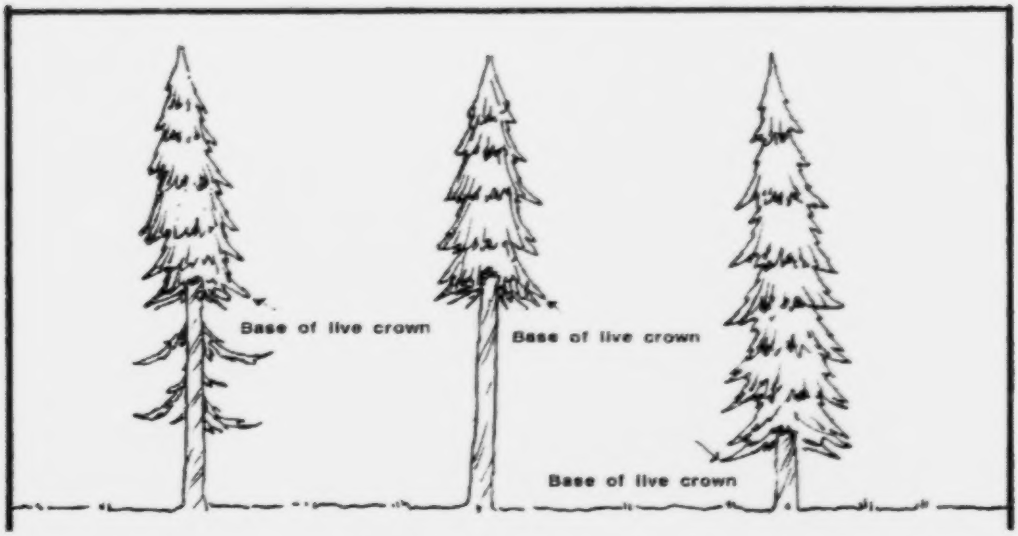

Base of live crown
Base of live crown
Base of live crown

FIGURE 2.5 BASE OF LIVE CROWN

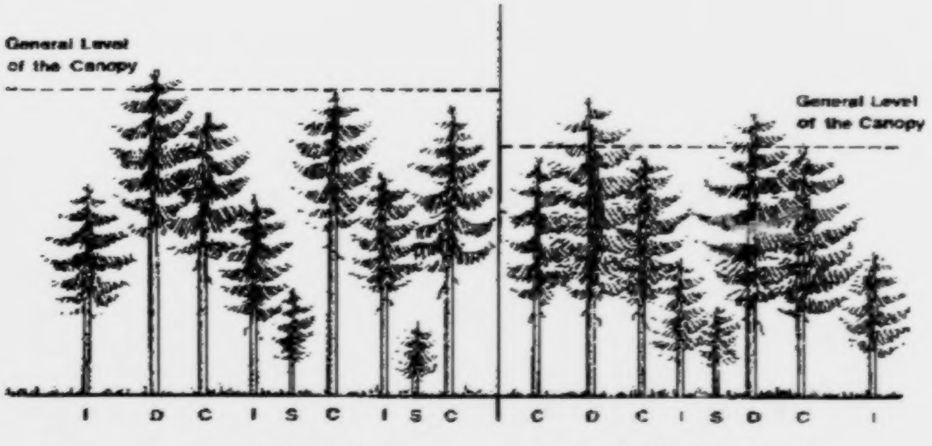

General Level of the Canopy
General Level of the Canopy
I D C I S C I S C
C D C I S D C I
Plot 1 of Stand A
Plot 2 of Stand A

FIGURE 2.6 CROWN CLASS

Note: a crown class is recorded for dieback/dead top (code 16). The top of the live foliage is used to determine crown class in this case.

D – Dominant	**-crowns extend above the general level of the canopy.**
C – Codominant	**-crowns form the general level of canopy.**
I – Intermediate	**- crowns below but extending into the bottom of the general level of the canopy.**
S – Suppressed	**-crowns entirely below the general level of the canopy.**
O – Open grown	**-if the trees branches does not interact with another trees branches.**

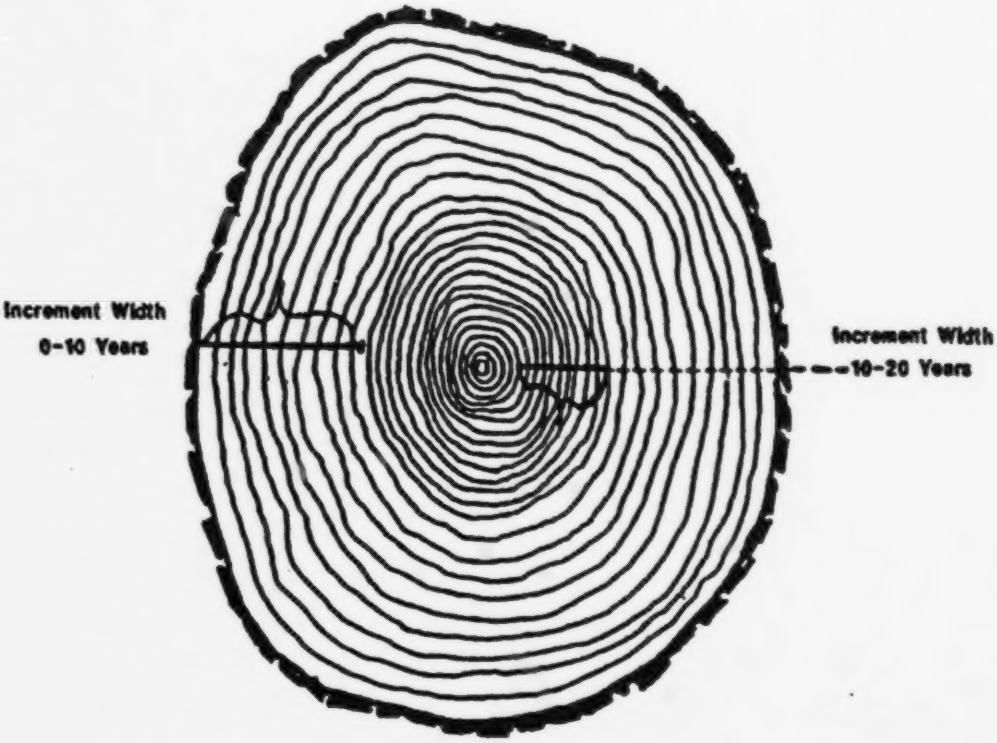
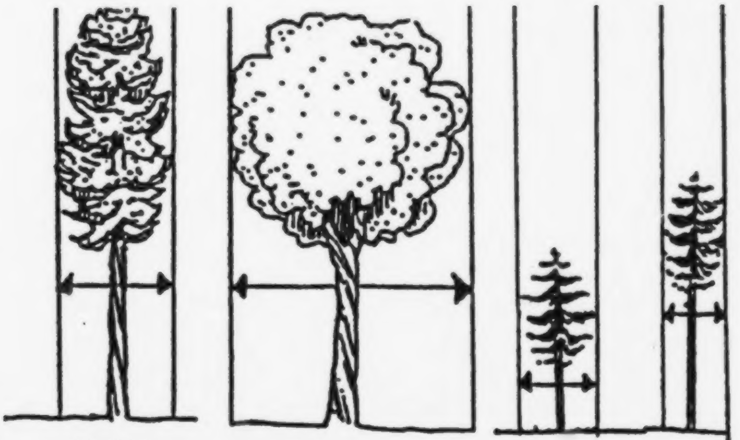


FIGURE 2.7 INCREMENT WIDTHS

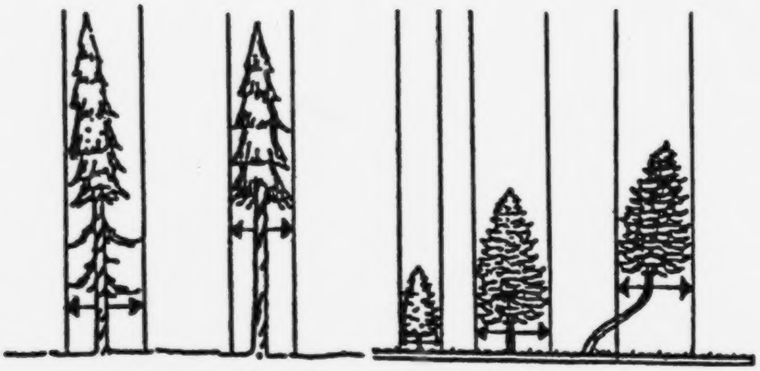
Picture A no longer apply



b) widest part of crown

c) Measure from stem out

d) Measure crown from widest branches. The widest branches may occur anywhere within the crown.



e) Width of crown

f) width of crown

FIGURE 2.8 CROWN WIDTH MEASUREMENT

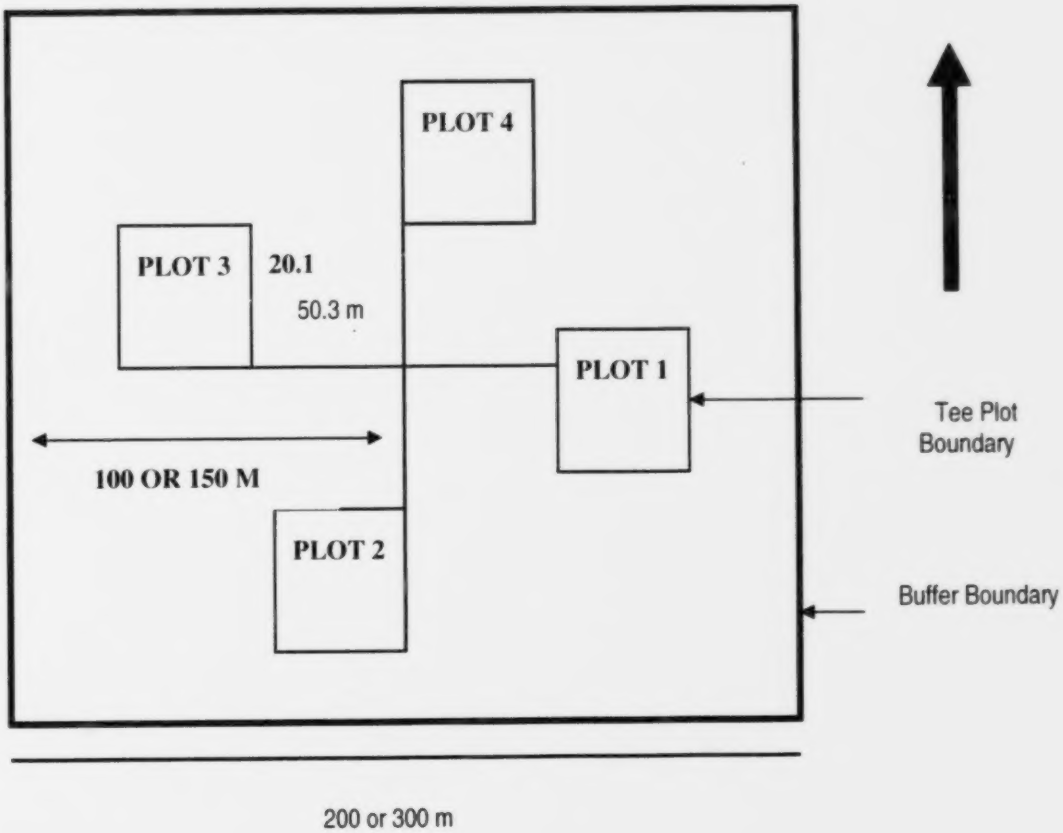
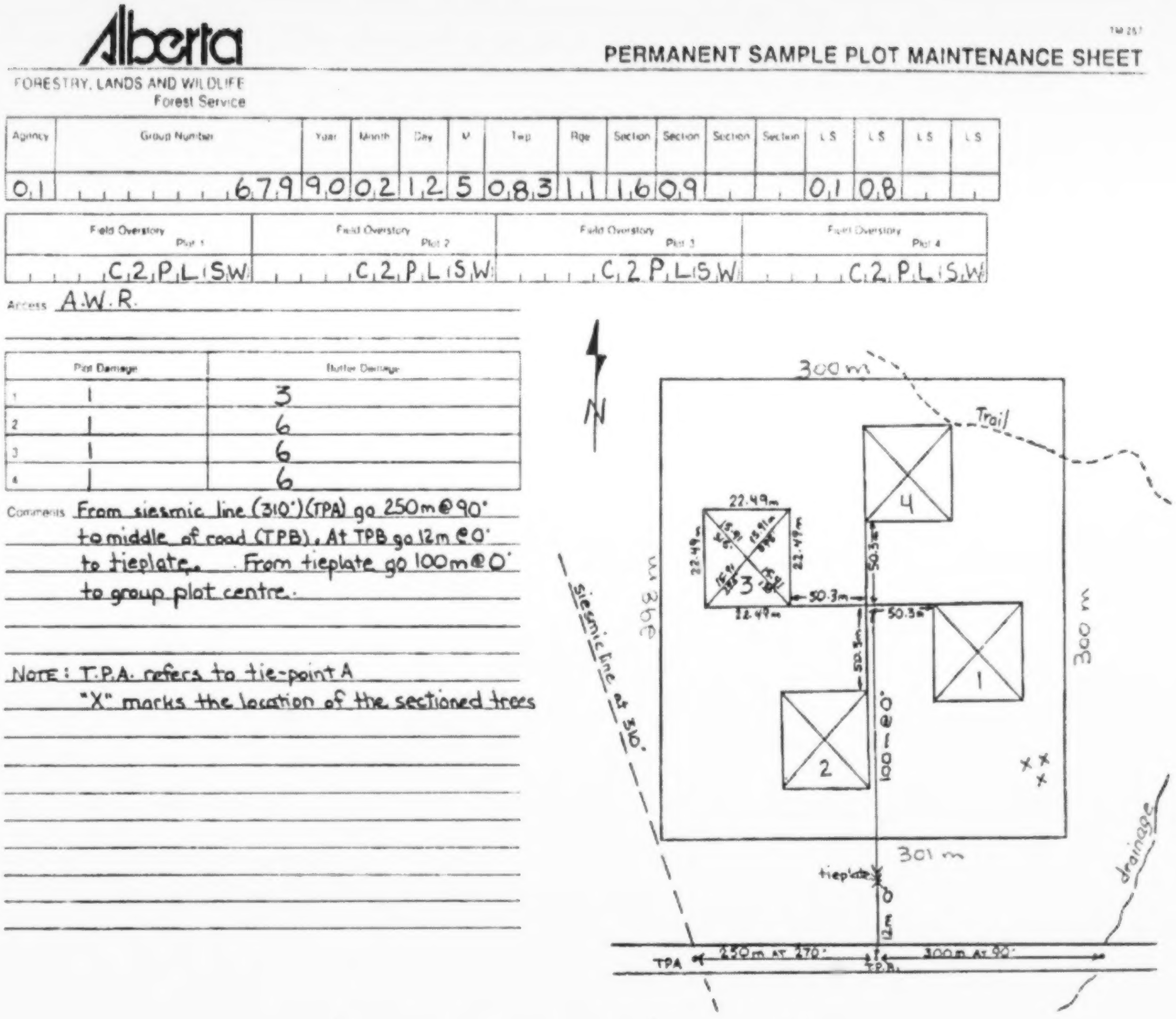

PLOT 4
PLOT 3
20.1
50.3 m
PLOT 1
Tee Plot Boundary
100 OR 150 M
PLOT 2
Buffer Boundary
200 or 300 m

FIGURE 2.9 PRE-APRIL 1981 PLOT LAYOUT



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Forest Service

TM 257

PERMANENT SAMPLE PLOT MAINTENANCE SHEET

Agency	Group Number	Year	Month	Day	M	Twp	Rge	Section	Section	Section	Section	LS	LS	LS	LS
01	679	90	02	12	5	083	11	16	09			01	08		

Field Overstory Plot 1	Field Overstory Plot 2	Field Overstory Plot 3	Field Overstory Plot 4
C2PLSW	C2PLSW	C2PLSW	C2PLSW

Access A.W.R.

	Plot Damage	Buffer Damage
1	1	3
2	1	6
3	1	6
4	1	6

Comments From siesmic line (310°)(TPA) go 250m @ 90° to middle of road (TPB). At TPB go 12m @ 0° to tieplate. From tieplate go 100m @ 0° to group plot centre.

NOTE: T.P.A. refers to tie-point A
"X" marks the location of the sectioned trees

N
300 m
Trail
4
22.49m
22.49m
22.49m
22.49m
15.91m
15.91m
15.91m
15.91m
3
50.3m
50.3m
50.3m
50.3m
1
2
100 @ 0°
396 m
300 m
siesmic line at 310°
X X
X
301 m
drainage
tieplate
12 m
TPA
250m AT 270°
TPB
300m AT 90°

FIGURE 2.10 GROUP PLOT MAINTENANCE FORM

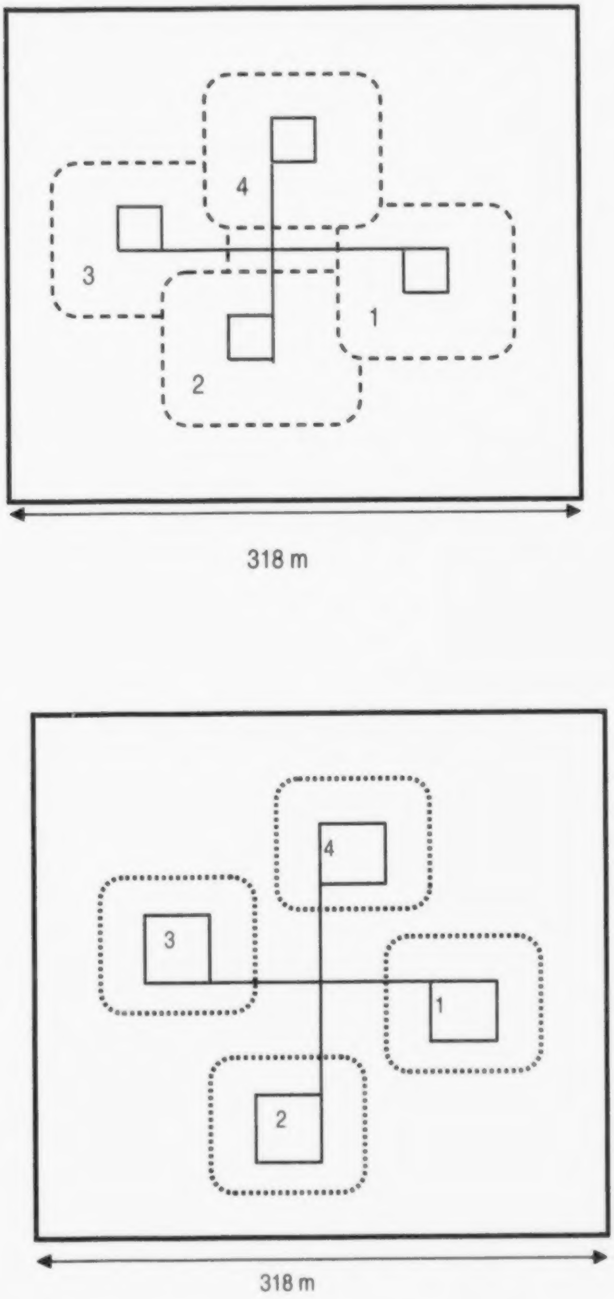
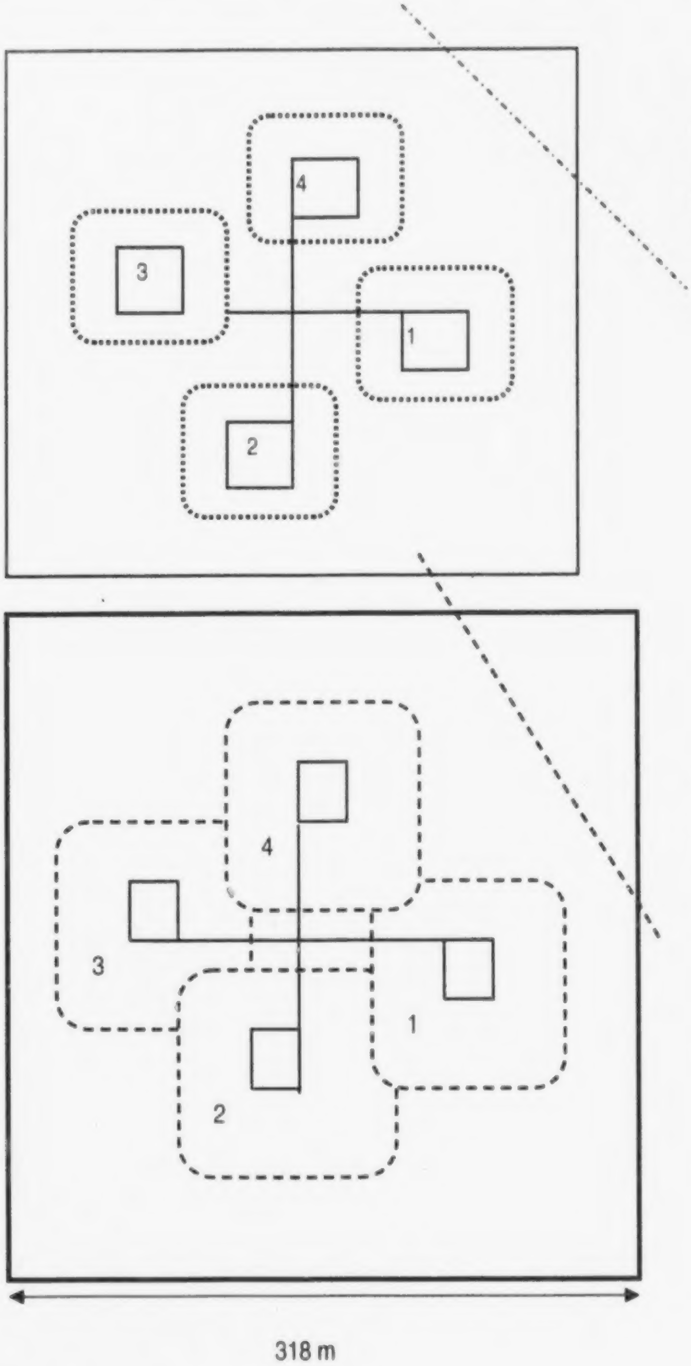

4
3
1
2
318 m
4
3
1
2
318 m

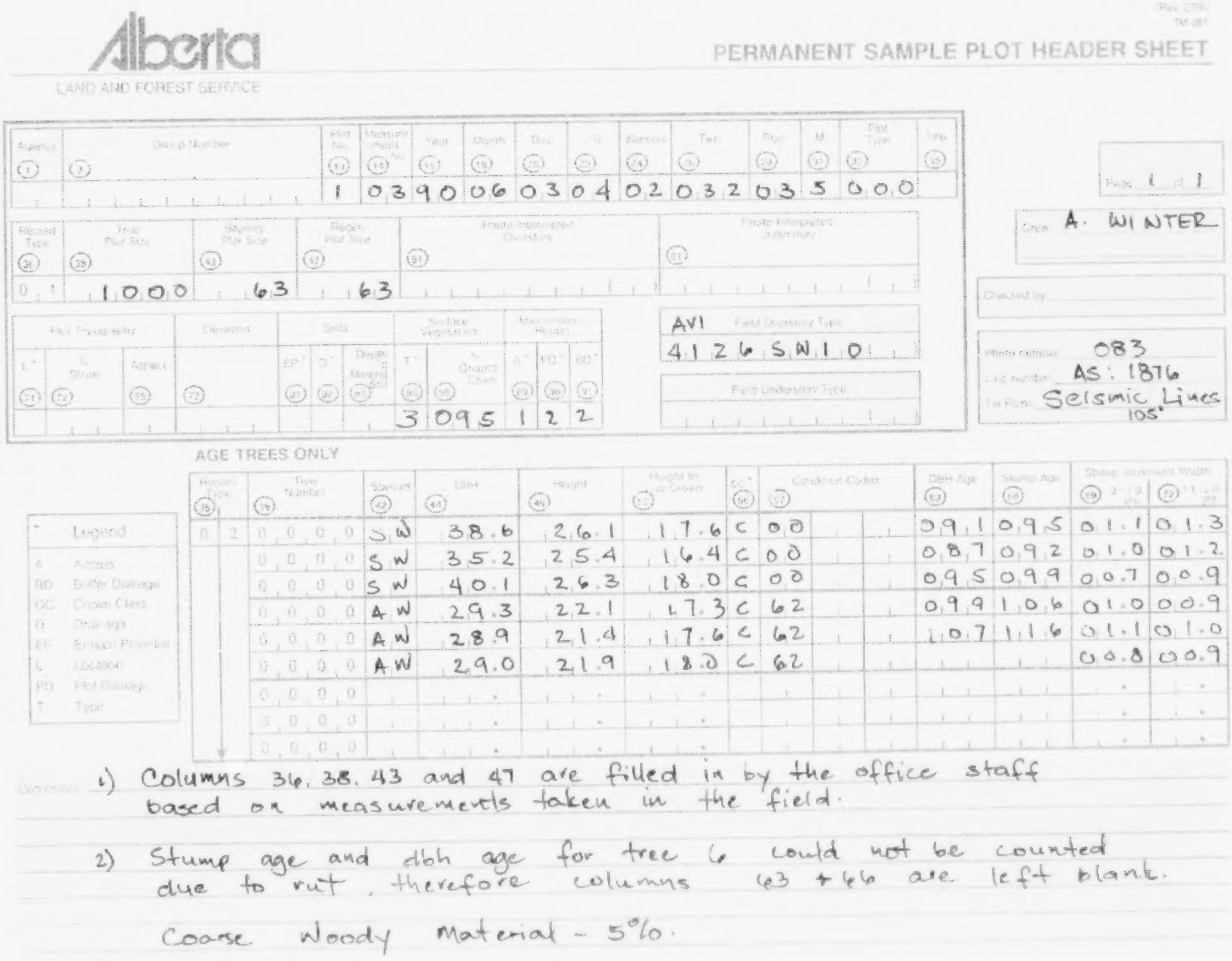
FIGURE 2.11 BUFFER DAMAGES AREA



The seismic line, in this example does not come within 20m of any of the subplots. Therefore, all subplots would have a code 6 recorded for buffer damages.

The seismic line, in this example is within 20 m of subplots 1 and 4. For these two subplots, a code 3 (manmade damage) is recorded in the buffer damage space. Code 6 is recorded for subplots 2 and 3 as damage is not within those buffer damage zones.

FIGURE 2.12 EXAMPLES OF BUFFER DAMAGE



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PERMANENT SAMPLE PLOT HEADER SHEET

Page 1 of 1

Crew A. WINTER

Checked by

Photo number 083
Line number AS: 1876
Tie Point Seismic Lines 105°

Agency (1)	Group Number (2)	Plot No. (11)	Measurement No. (14)	Year (15)	Month (18)	Day (20)	L.S. (22)	Section (24)	Twp (26)	Rge (29)	M (31)	Plot Type (32)	Inp (35)
		1	03	90	06	03	04	02	032	03	5	000	

Record Type (36)	True Plot Size (38)	Sapling Plot Size (43)	Regen Plot Size (47)	Photo Interpreted Overstory (51)	Photo Interpreted Understory (61)
0 1	1000	63	63		

Plot Topography: L* (71)	% Slope (72)	Aspect (75)	Elevation (77)	Soils: EP* (81)	D* (82)	Depth to Mineral Soil (83)	Surface Vegetation: T* (85)	% Ground Cover (86)	Max Understory Height: A* (89)	PD* (90)	BD* (91)
							3	095	1	2	2

AVI Field Overstory Type
4126SW10

Field Understory Type

AGE TREES ONLY

Record Type (35)	Tree Number (39)	Species (42)	DBH (44)	Height (48)	Height to Live Crown (52)	CC* (56)	Condition Codes (57)	DBH Age (63)	Stump Age (66)	Stump Increment Width 0-10 yrs (69)	Stump Increment Width 11-20 yrs (72)
0 2	0000	SW	38.6	26.1	17.6	C	00	091	095	01.1	01.3
	0000	SW	35.2	25.4	16.4	C	00	087	092	01.0	01.2
	0000	SW	40.1	26.3	18.0	C	00	095	099	00.7	00.9
	0000	AW	29.3	22.1	17.3	C	62	099	106	01.0	00.9
	0000	AW	28.9	21.4	17.6	C	62	107	116	01.1	01.0
	0000	AW	29.0	21.9	18.0	C	62			00.8	00.9
	0000										
	0000										
	0000										

*	Legend
A	Access
BD	Buffer Damage
CC	Crown Class
D	Drainage
EP	Erosion Potential
L	Location
PD	Plot Damage
T	Type

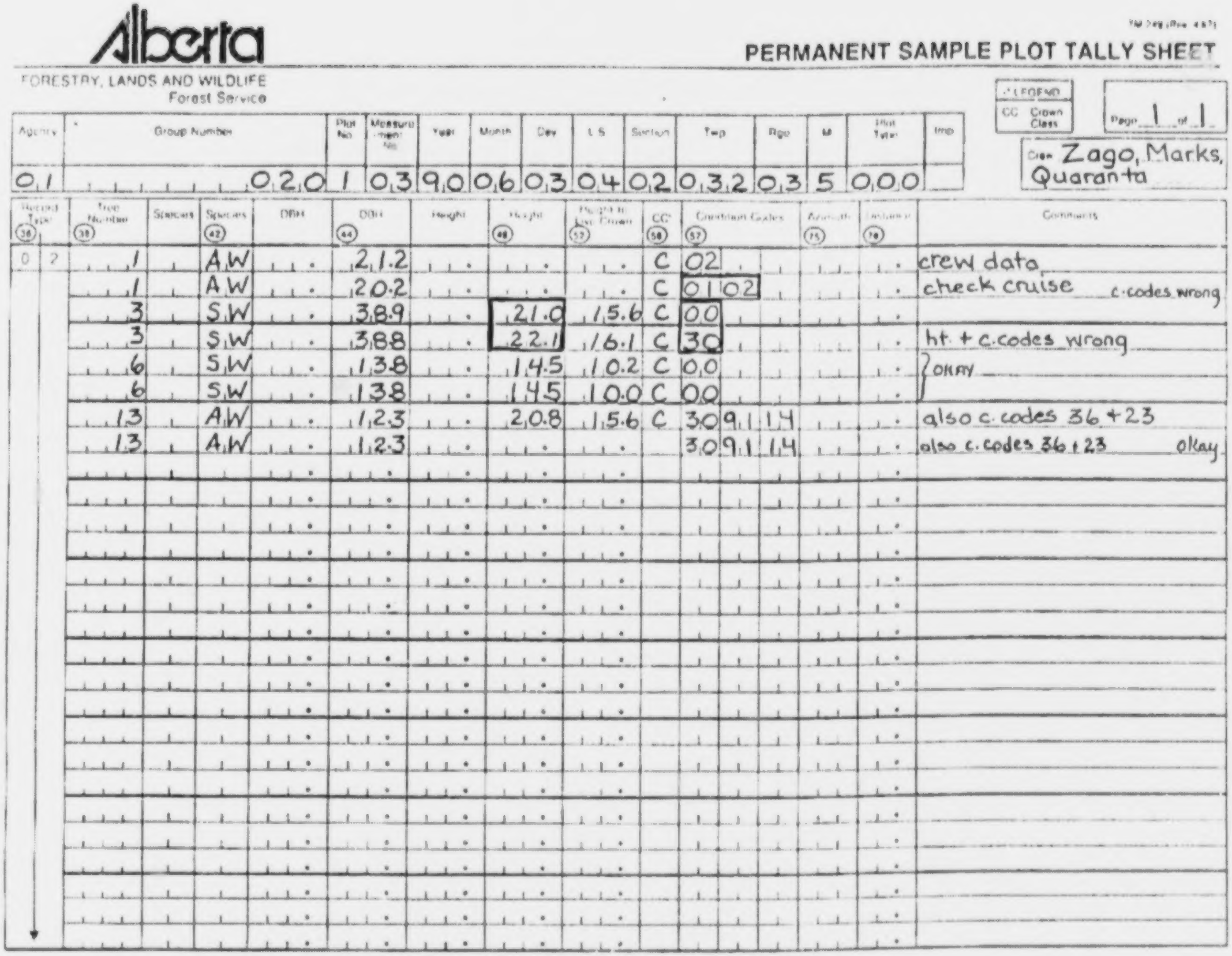
Comments

1) Columns 36, 38, 43 and 47 are filled in by the office staff based on measurements taken in the field.

2) Stump age and dbh age for tree 6 could not be counted due to rut, therefore columns 63 + 66 are left blank.

Coarse Woody Material - 5%.

FIGURE 2.13 DATA ENTRY ON PSP HEADER SHEET



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Forest Service

[illegible]

PERMANENT SAMPLE PLOT TALLY SHEET

LEGEND
CC Crown Class

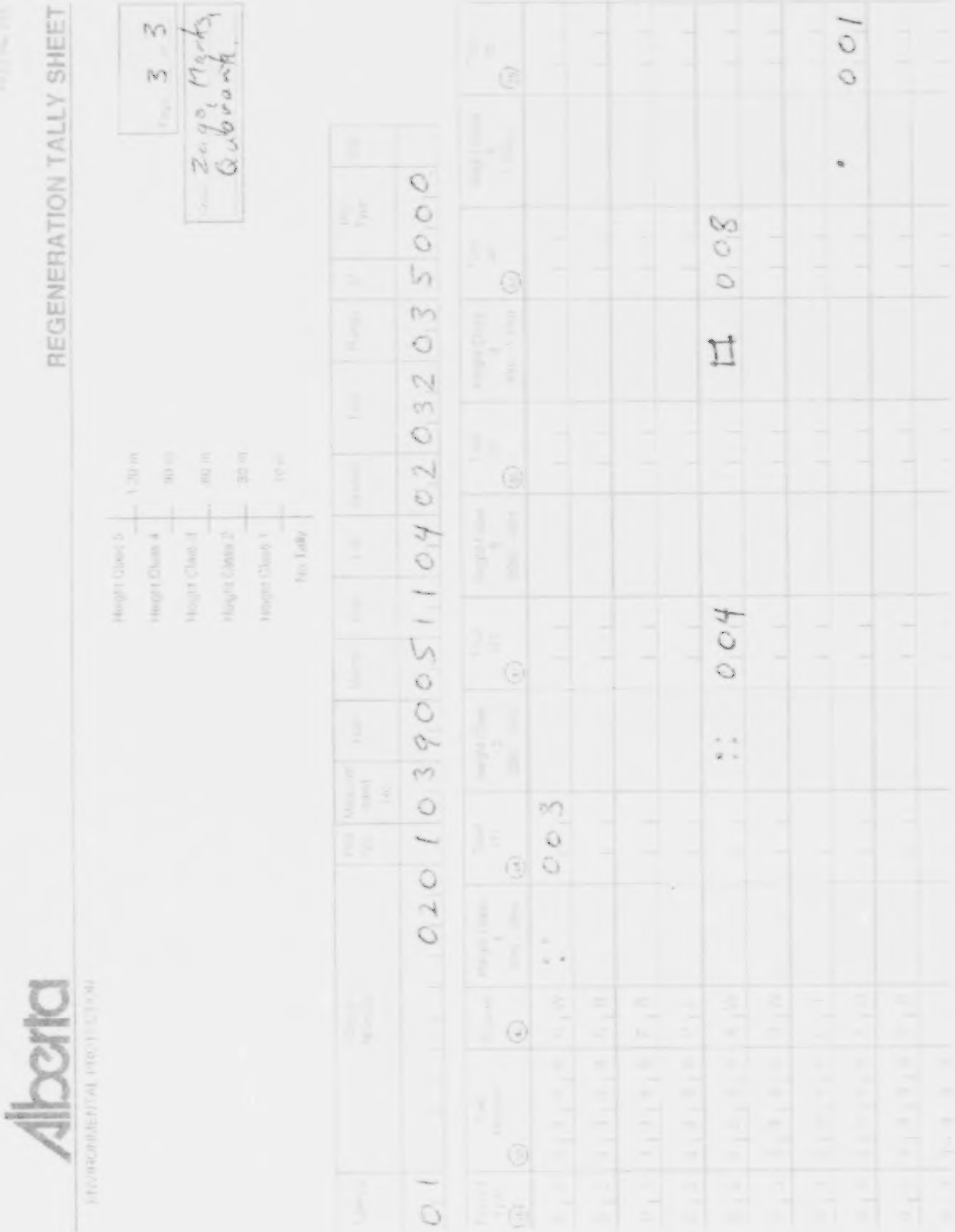
Page 1 of 1

Crew Zago, Marks, Quaranta

Agency	Group Number	Plot No	Measurement No	Year	Month	Day	LS	Section	Twp	Rge	M	Plot Type	Imp
01	020	1	03	90	06	03	04	02	032	03	5	000	

Record Type (36)	Tree Number (38)	Spacers	Species (42)	DBH	DBH (44)	Height	Height (48)	Height to Live Crown (52)	CC (56)	Condition Codes (57)	Azimuth (75)	Distance (78)	Comments
02	1		AW		21.2				C	02			crew data
	1		AW		20.2				C	01 02			check cruise c.codes wrong
	3		SW		38.9		21.0	15.6	C	00			
	3		SW		38.8		22.1	16.1	C	30			ht. + c.codes wrong
	6		SW		13.8		14.5	10.2	C	00			} OKAY
	6		SW		13.8		14.5	10.0	C	00			
	13		AW		12.3		20.8	15.6	C	30 91 14			also c.codes 36 + 23
	13		AW		12.3					30 91 14			also c.codes 36 + 23 okay

FIGURE 2.14 DATA ENTRY ON PSP TALLY SHEET



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ENVIRONMENTAL PROTECTION

REGENERATION TALLY SHEET

3 3

Zago, Marks, Gubrank.

Height Class 5 — 1.30 m

Height Class 4 — 90 cm

Height Class 3 — 60 cm

Height Class 2 — 30 cm

Height Class 1 — 10 cm

No Tally

01 020 1 03 9 005 1 1 04 02 032 035 000

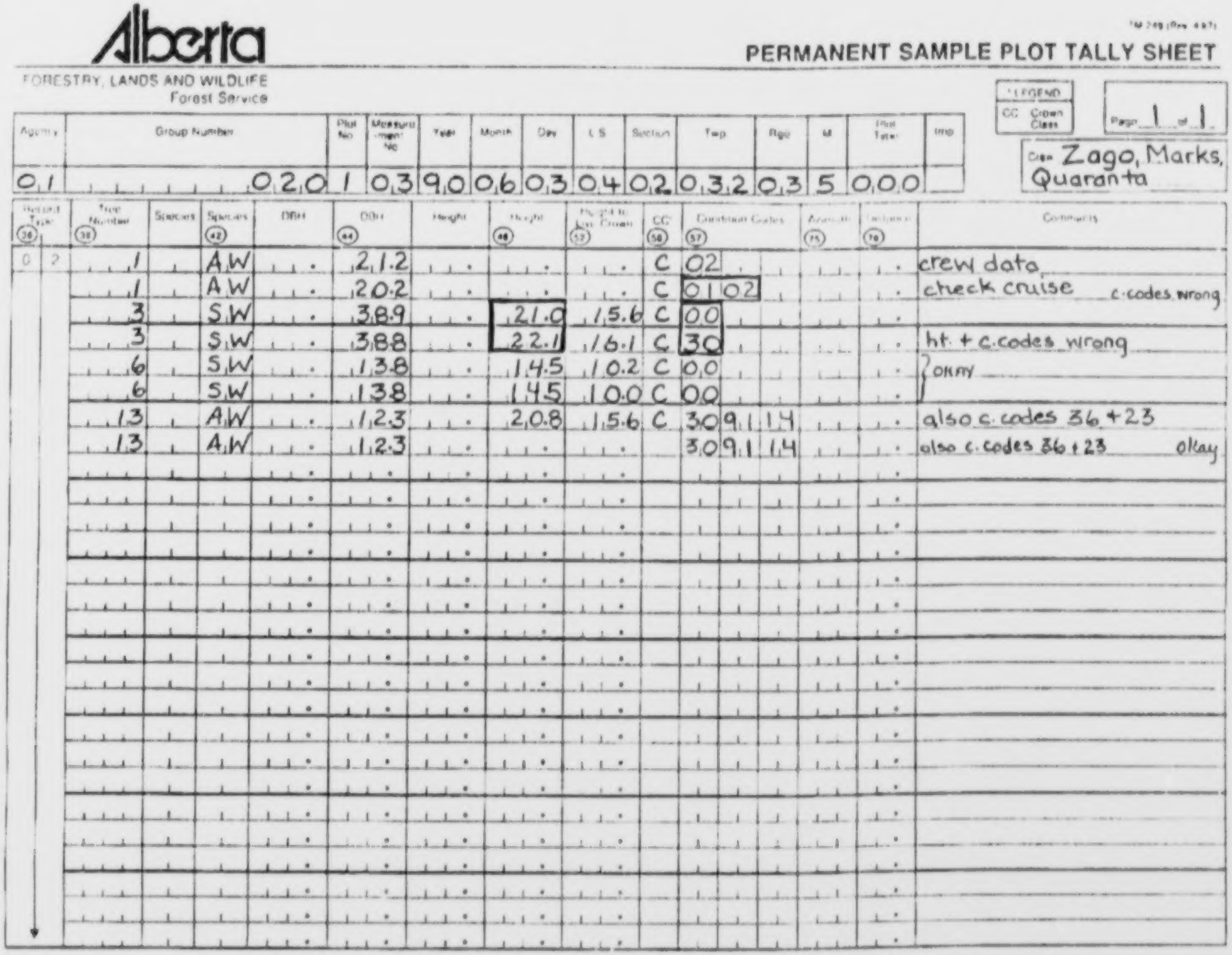
003

004

008

001

FIGURE 2.15 DATA ENTRY ON REGENERATION TALLY SHEET



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Forest Service

[illegible]

PERMANENT SAMPLE PLOT TALLY SHEET

* LEGEND	
CC	Crown Class

Page 1 of 1

Crew Zago, Marks, Quaranta

Agency	Group Number	Plot No	Measurement No	Year	Month	Day	LS	Section	Twp	Rge	M	Plot Type	Imp
01	020	1	03	90	06	03	04	02	032	03	5	000	

Record Type (36)	Tree Number (38)	Species	Species (42)	DBH	DBH (44)	Height	Height (48)	Height to Live Crown (52)	CC (56)	Condition Codes (57)	Azimuth (75)	Distance (78)	Comments
02	1		AW		21.2				C	02			crew data
	1		AW		20.2				C	01 02			check cruise c·codes wrong
	3		SW		38.9		21.0	15.6	C	00			
	3		SW		38.8		22.1	16.1	C	30			ht. + c.codes wrong
	6		SW		13.8		14.5	10.2	C	00			okay
	6		SW		13.8		14.5	10.0	C	00			
	13		AW		12.3		20.8	15.6	C	30 91 14			also c.codes 36 + 23
	13		AW		12.3					30 91 14			also c. codes 36 + 23 okay

FIGURE 3.1 PSP TREE TALLY CHECK SHEET

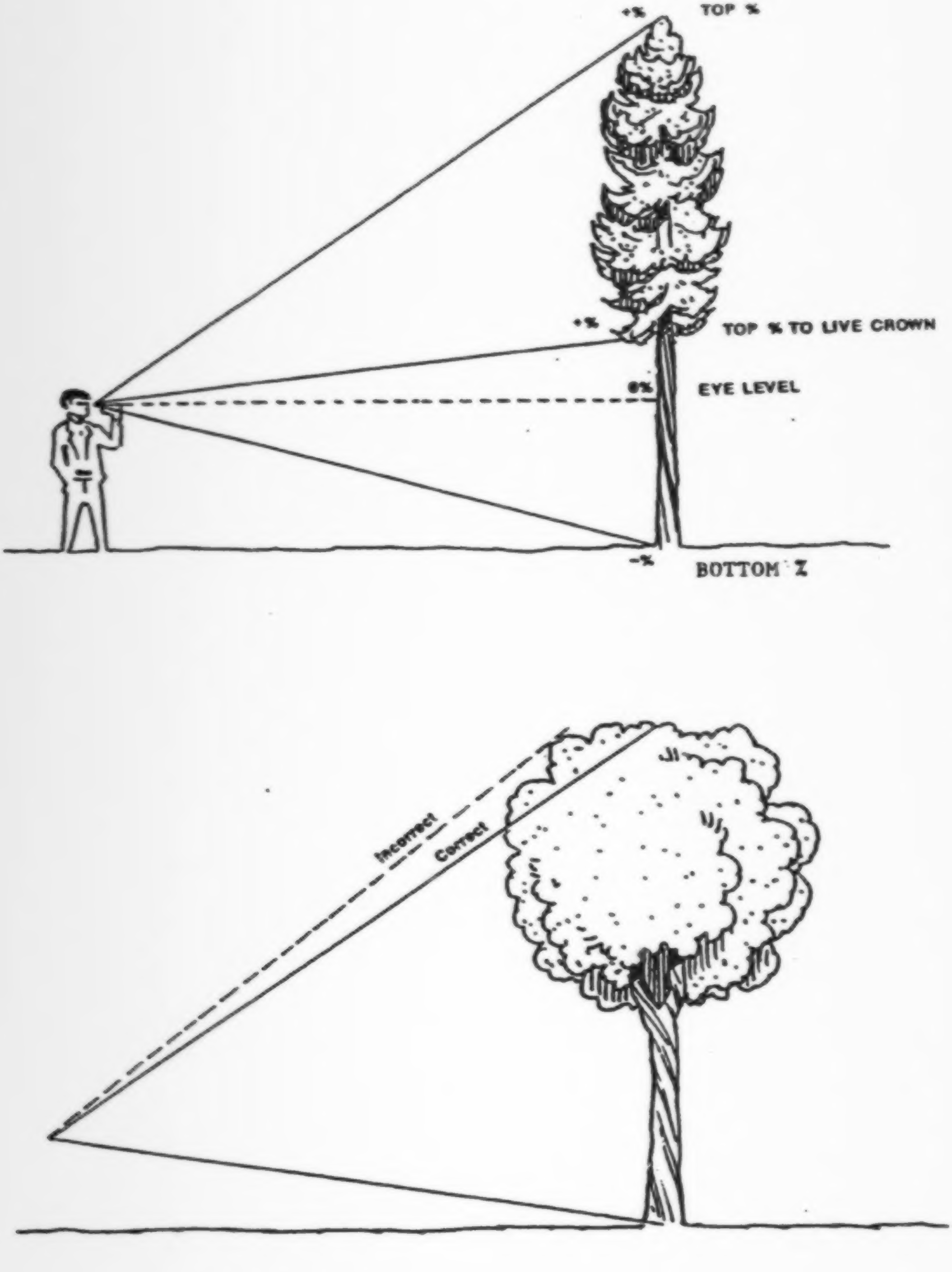
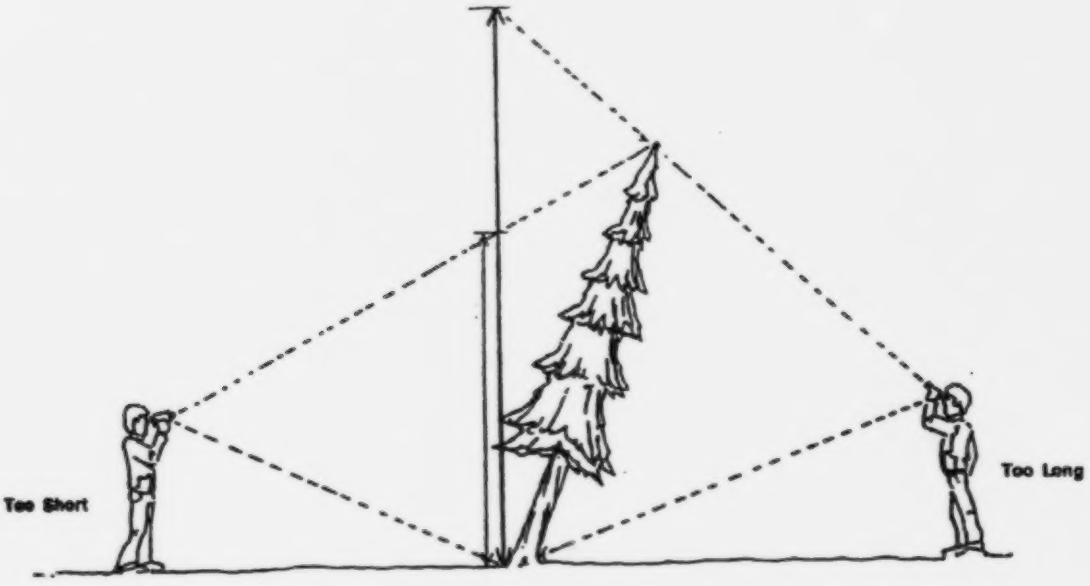
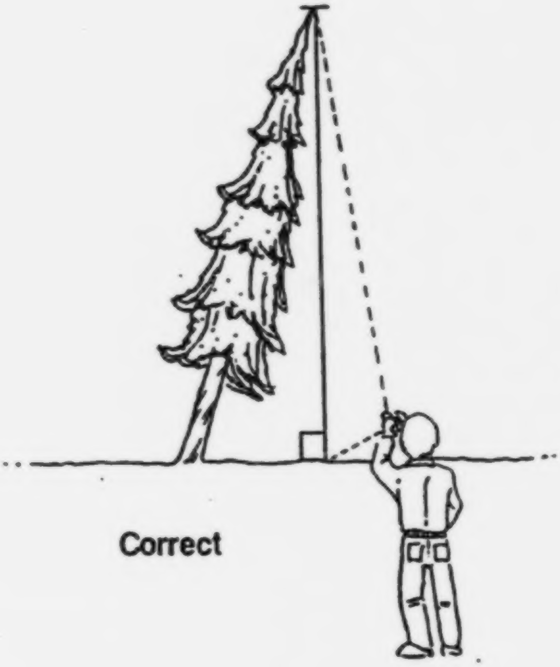

+%
TOP %
+%
TOP % TO LIVE CROWN
0%
EYE LEVEL
-%
BOTTOM %
Incorrect
Correct

FIGURE 4.1 TREE HEIGHT MEASUREMENT


Too Short
Too Long

Incorrect



Correct

FIGURE 4.2 HEIGHT MEASUREMENT OF LEANING TREES

FIGURE 4.3 CONK AND BLIND CONKS

FIGURE 4.4 OPEN SCARS

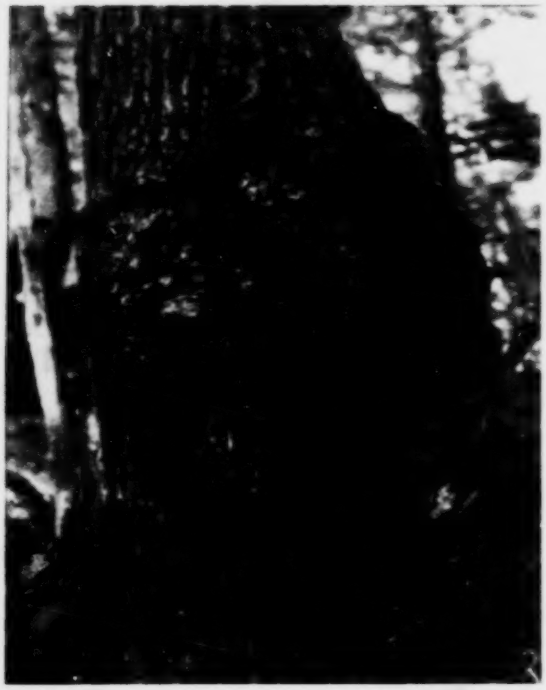
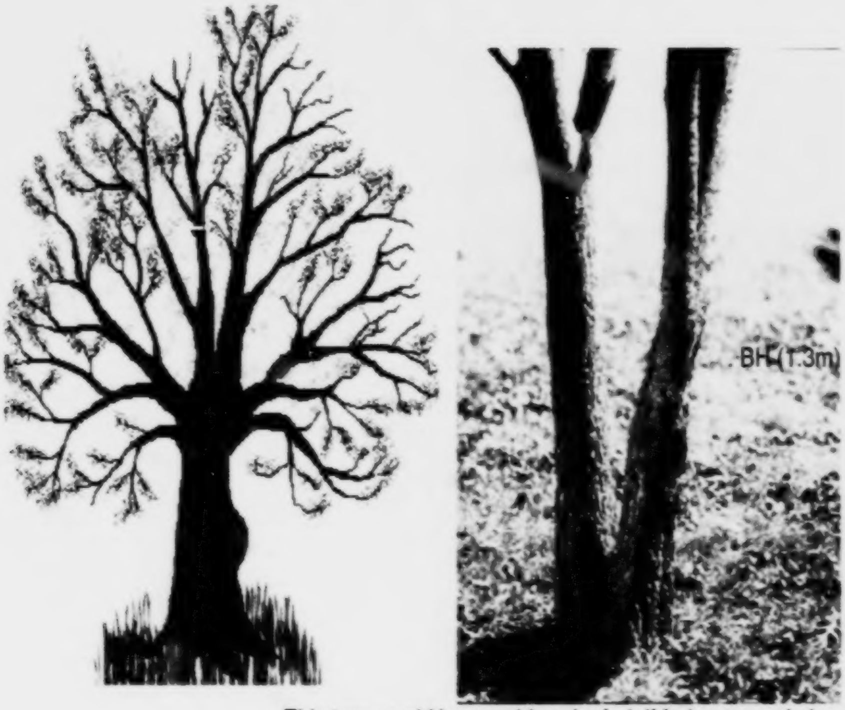


FIGURE 4.5 **LARGE BURL ON MAIN STEM**



This tree would be considered a fork if fork occurred above the DBH

FIGURE 4.6 **FORKS**

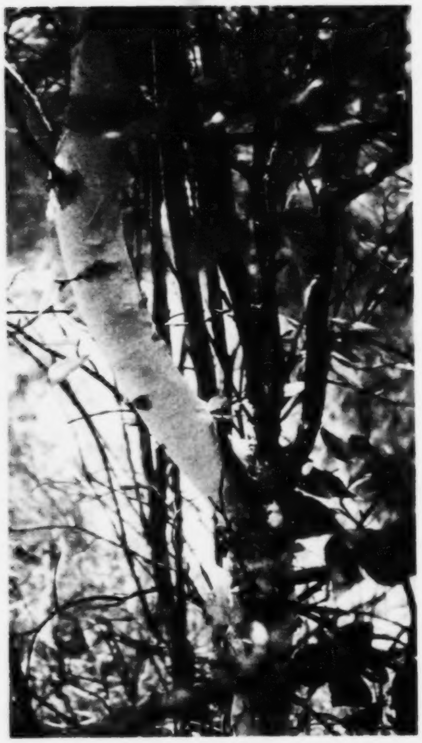


FIGURE 4.7 PRONOUNCED CROOK

FIGURE 4.8 LEANING TREE

FIGURE 4.9 ATROPELLIS CANKER

FIGURE 4.10 WITCHES ON SPRUCE

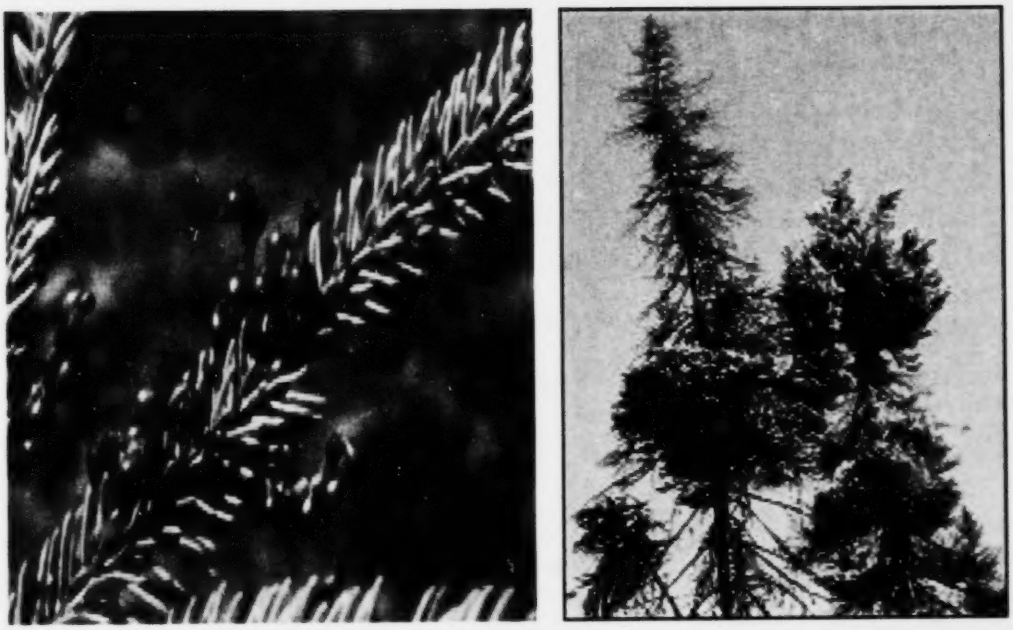
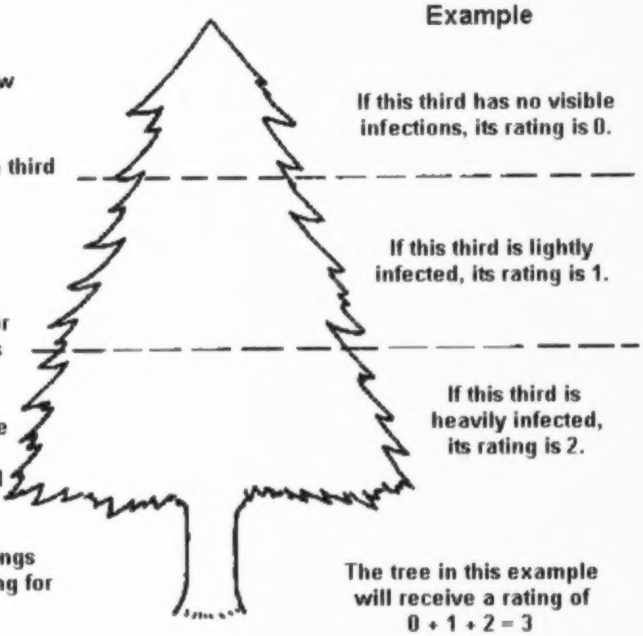


FIGURE 4.11 MISTLETOE



Instructions

Step 1: Divide live cronw into thirds.

Step 2: rate each third separately. Give each third a rating of 0, 1, or 2 as described below.

0 - No visible infections

1 - Light infection (half or less of total branches in the third infected)

2 - Heavy infection (more than half of total branches in the third infected)

Step 3: Finally, add ratings of thirds to obtain rating for total tree.

Example

If this third has no visible infections, its rating is 0.

If this third is lightly infected, its rating is 1.

If this third is heavily infected, its rating is 2.

The tree in this example will receive a rating of 0 + 1 + 2 = 3

FIGURE 4.12 INSTRUCTIONS AND EXAMPLE OF THE USE OF THE 6 CLASS MISTLETOE RATING SYSTEM (HAWKSWORTH 1961, 1977)

CODES

91 One of the 1/3 sections has light infection (1) + other 2/3 have no visible infections.

92 Two of the 1/3 sections has light infection (10) + or one 1/3 section ahs a heavy infection only.

93 All three of the 1/3 sections has light infection (1) + or one 1/3 section has a heavy infection, one has a light infection + last 1/3 has no infection.

94 If total ratings = 4 then this code is used.

95 If total ratings = 5 then this code is used.

96 If total ratings = 6 then this code is used.

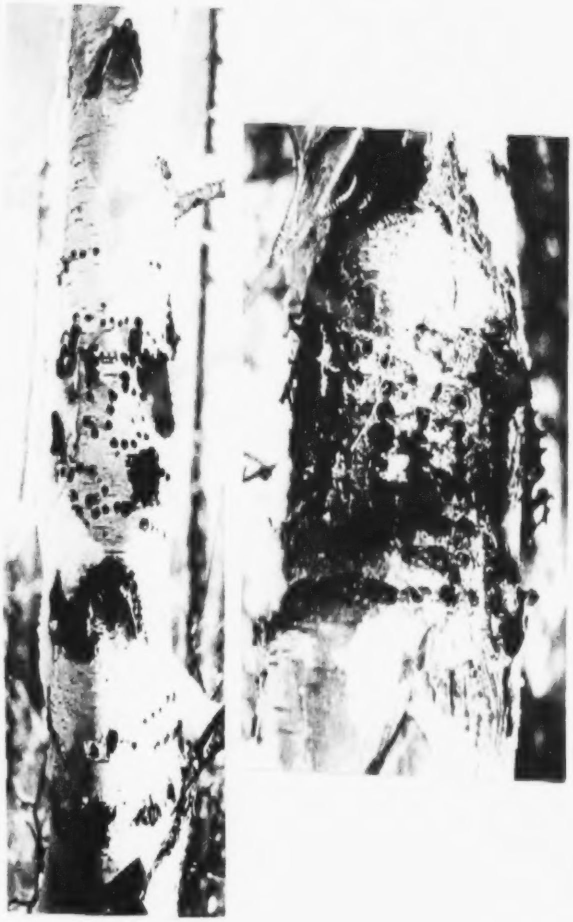


FIGURE 4.13 GENERIC WOODPECKER

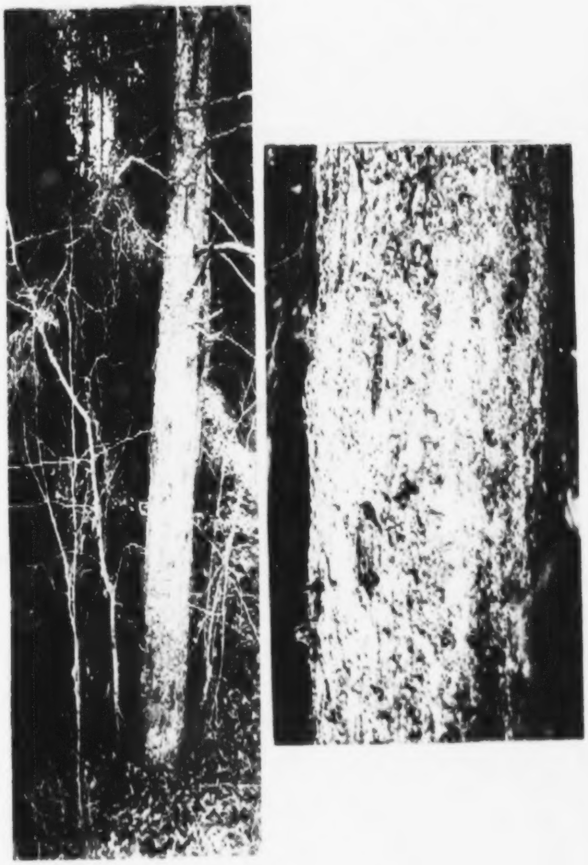


FIGURE 4.14 YELLOWBELLIED SAPSUCKER FEEDING

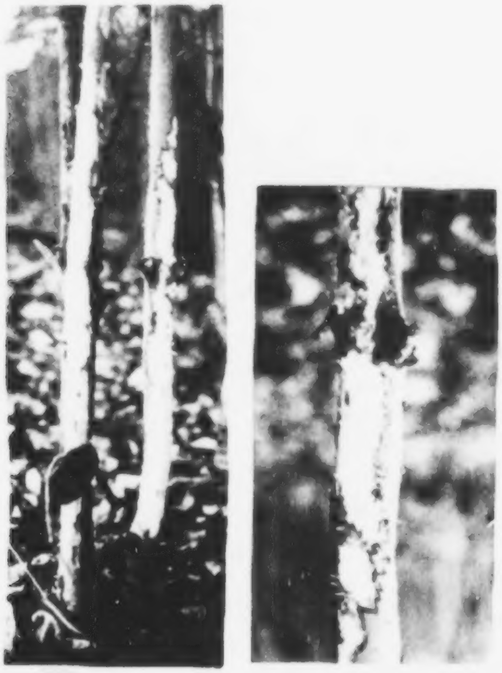


FIGURE 4.15 SMALL MAMMAL FEEDING ON TREE BOLE

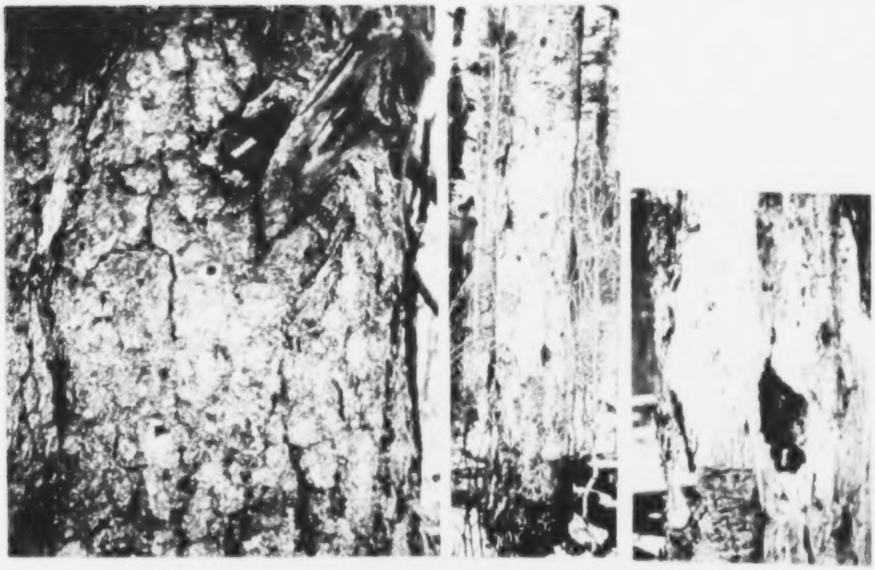


FIGURE 4.16 EXCAVATIONS BY WOODPECKERS

FIGURE 4.17 SMALL CAVITY

FIGURE 4.18 LARGE CAVITY

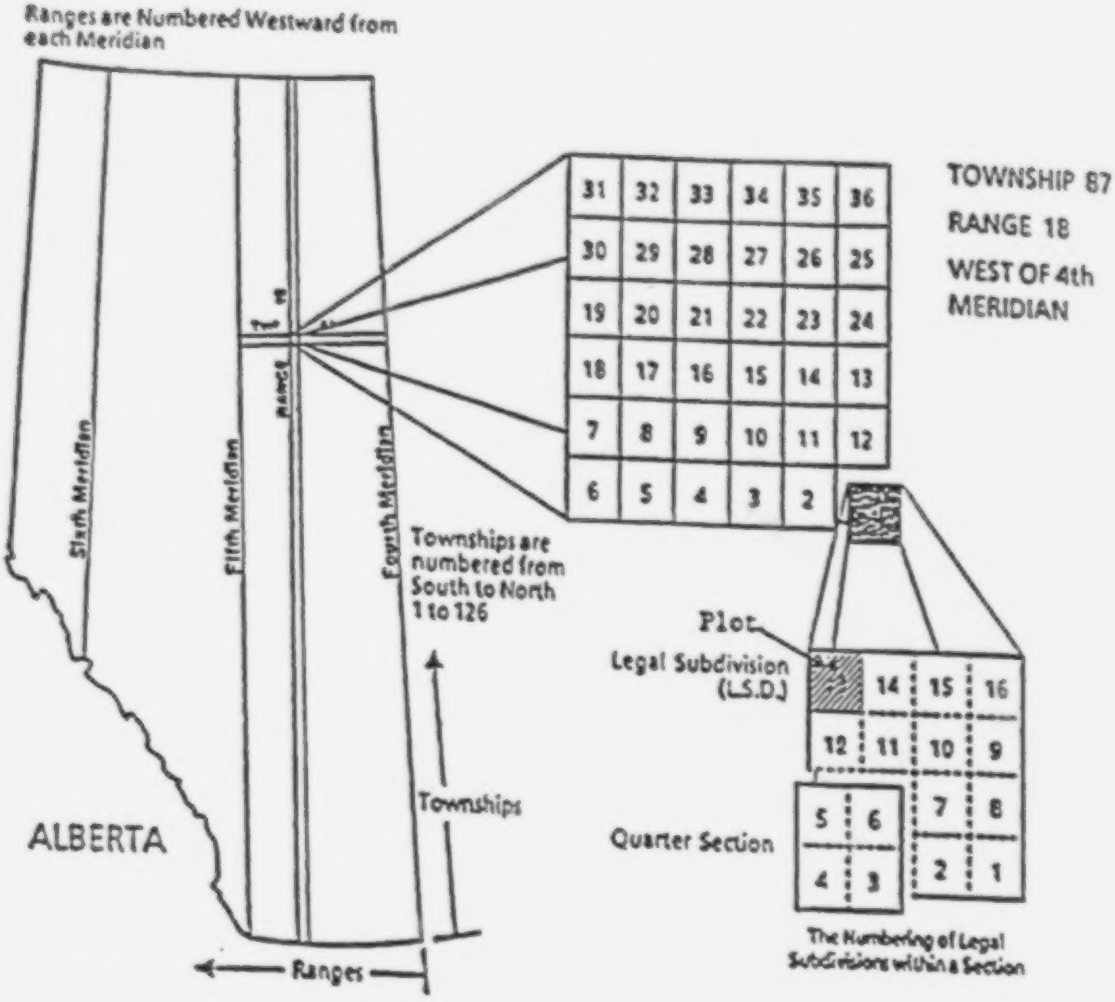

Ranges are Numbered Westward from each Meridian
Sixth Meridian
Fifth Meridian
Fourth Meridian
RANGE
Townships are numbered from South to North 1 to 126
Townships
Ranges
ALBERTA
31 32 33 34 35 36
30 29 28 27 26 25
19 20 21 22 23 24
18 17 16 15 14 13
7 8 9 10 11 12
6 5 4 3 2
TOWNSHIP 87
RANGE 18
WEST OF 4th MERIDIAN
Plot
Legal Subdivision (L.S.D.)
14 15 16
12 11 10 9
7 8
2 1
Quarter Section
5 6
4 3
The Numbering of Legal Subdivisions within a Section

FIGURE 4.19 ALBERTA SURVEY SYSTEM[2]

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[2] Alberta Bureau of Surveying and Mapping. 1986 Maps of Alberta Catalogue 1986-87. Government of Alberta ENR No. Ref 11 86 pp.iv.

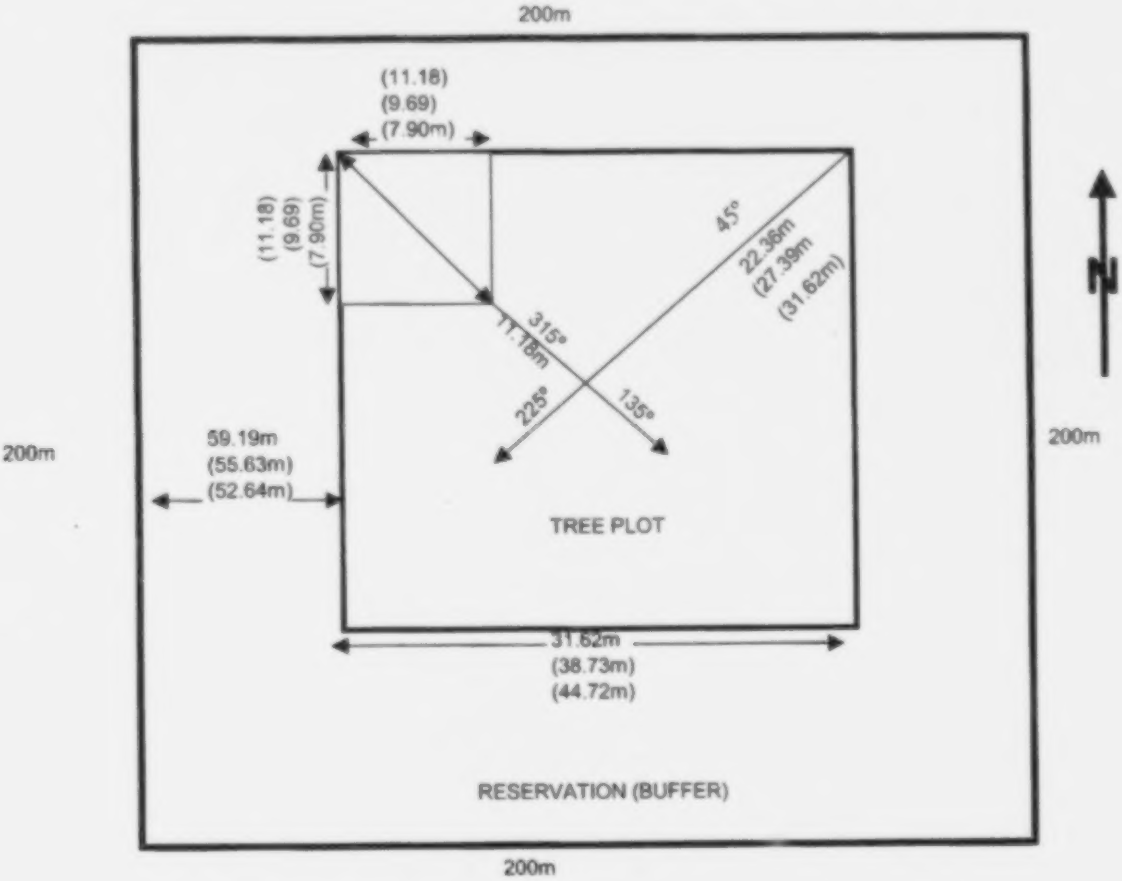
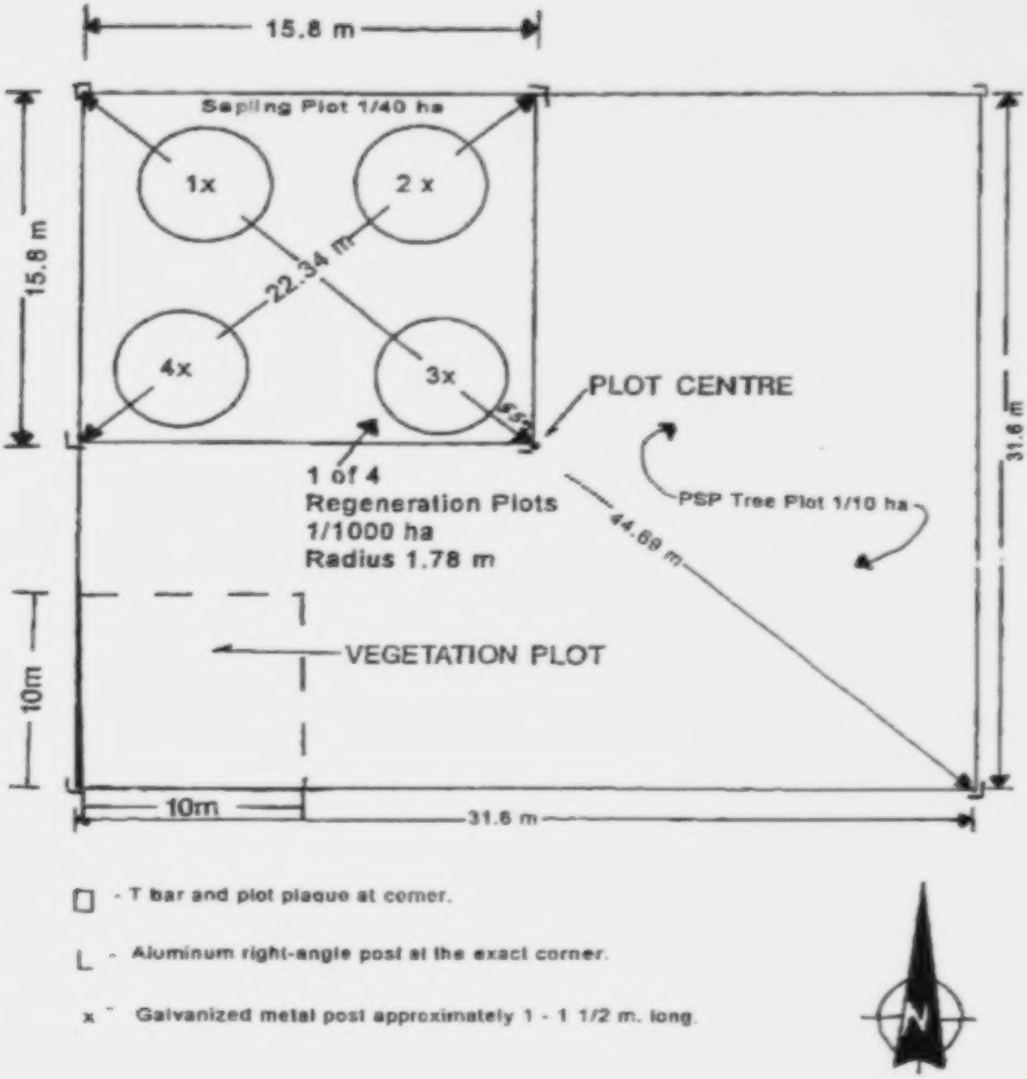

200m
(11.18)
(9.69)
(7.90m)
(11.18)
(9.69)
(7.90m)
45°
22.36m
(27.39m)
(31.62m)
315°
11.18m
225°
135°
200m
59.19m
(55.63m)
(52.64m)
200m
TREE PLOT
31.62m
(38.73m)
(44.72m)
RESERVATION (BUFFER)
200m
N

FIGURE 4.20 PLOT BOUNDARIES


15.8 m
Sapling Plot 1/40 ha
15.8 m
1x
2 x
22.34 m
4x
3x
5.5
PLOT CENTRE
1 of 4
Regeneration Plots
1/1000 ha
Radius 1.78 m
PSP Tree Plot 1/10 ha
44.69 m
31.6 m
10m
VEGETATION PLOT
10m
31.6 m
N

□ - T bar and plot plaque at corner.

L - Aluminum right-angle post at the exact corner.

x - Galvanized metal post approximately 1 - 1 1/2 m. long.

FIGURE 4.21 STAND DYNAMICS PLOT LAYOUT

Alberta
ENVIRONMENTAL PROTECTION

[illegible]

PERMANENT SAMPLE PLOT HEADER SHEET

Agency	Group Number	Year	Month	Day	M	Twp	Rge.	Section	Section	Section	Section	L.S.	L.S.	L.S.	L.S.
01	4036	1998	05	29	5	062	12	14	15			05	12	08	09

AVI Field Overstory	AVI Field Understory	AVI Field Overstory Plot 3	AVI Field Overstory Plot 4
4u 12AW 7PB3(	14-6SW7PB2AW		

Access 1- AWR

Plot Damage	Buffer Damage
Browsing (Not)	North side along road + Natural
Code - 2	Code - 4

Comments From intersection of Hwy 32 + the airport/firebase road (in Swan Hills) travel South on Hwy 32 for 44.4 km + turn right. Travel 0.4 km + turn left. Travel 731 m from road junction to TP A. From TP A go 98m @ 225° to Plot Center. Declination 20°E

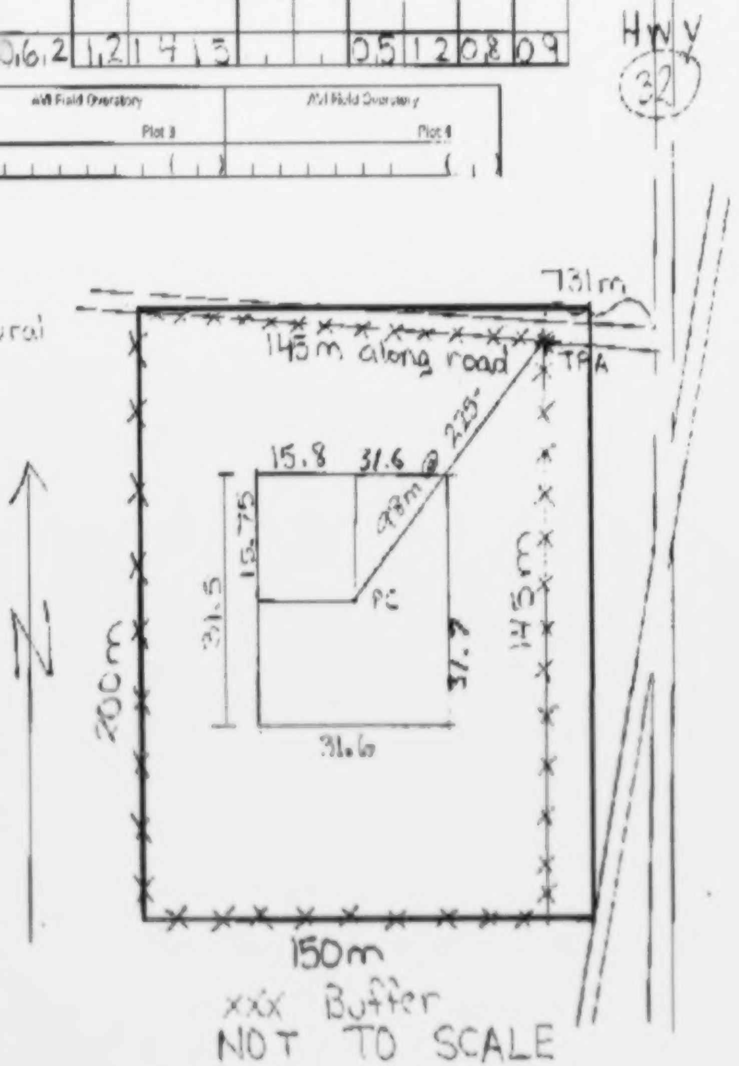

HWY
32
731m
145m along road
TPA
225°
98m
PC
15.8
31.6 @
15.75
31.5
31.7
31.6
145m
200m
150m
N
xxx Buffer
NOT TO SCALE

FIGURE 4.22 PLOT MAINTENANCE REPORT

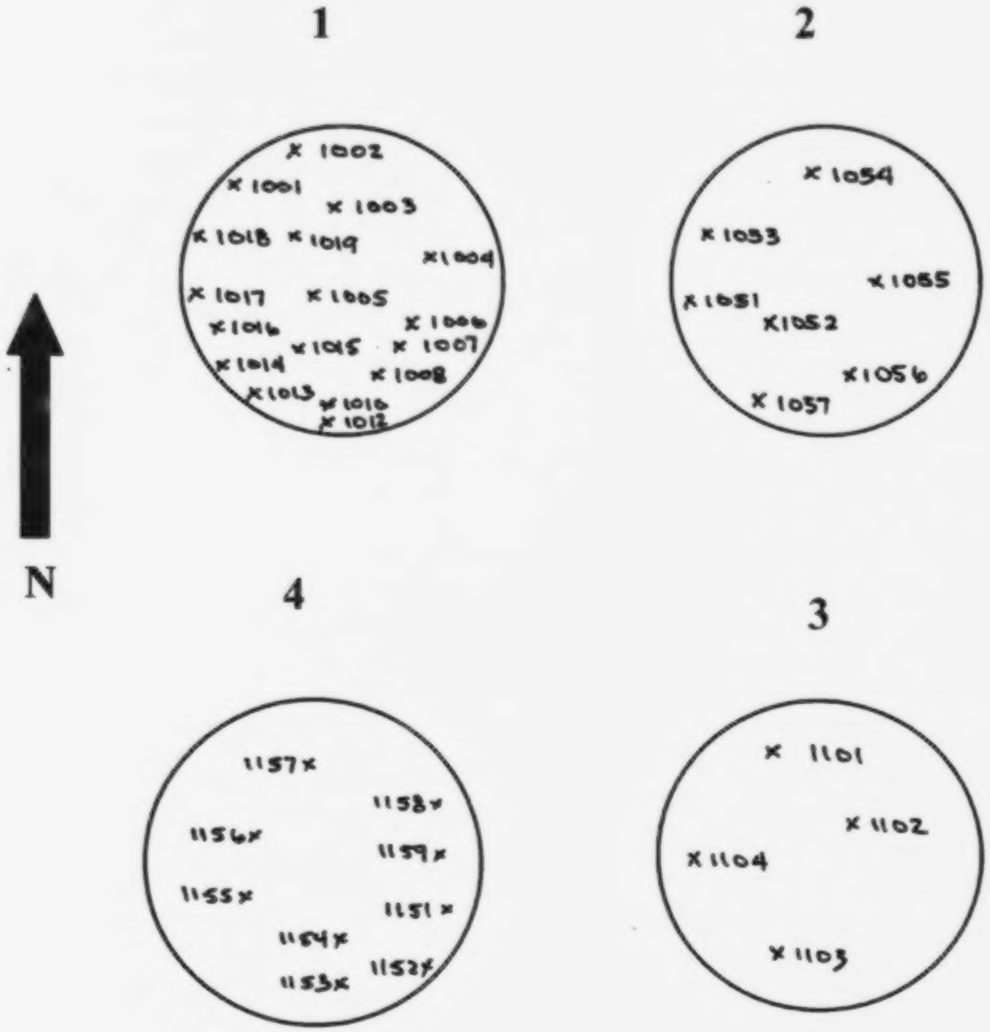
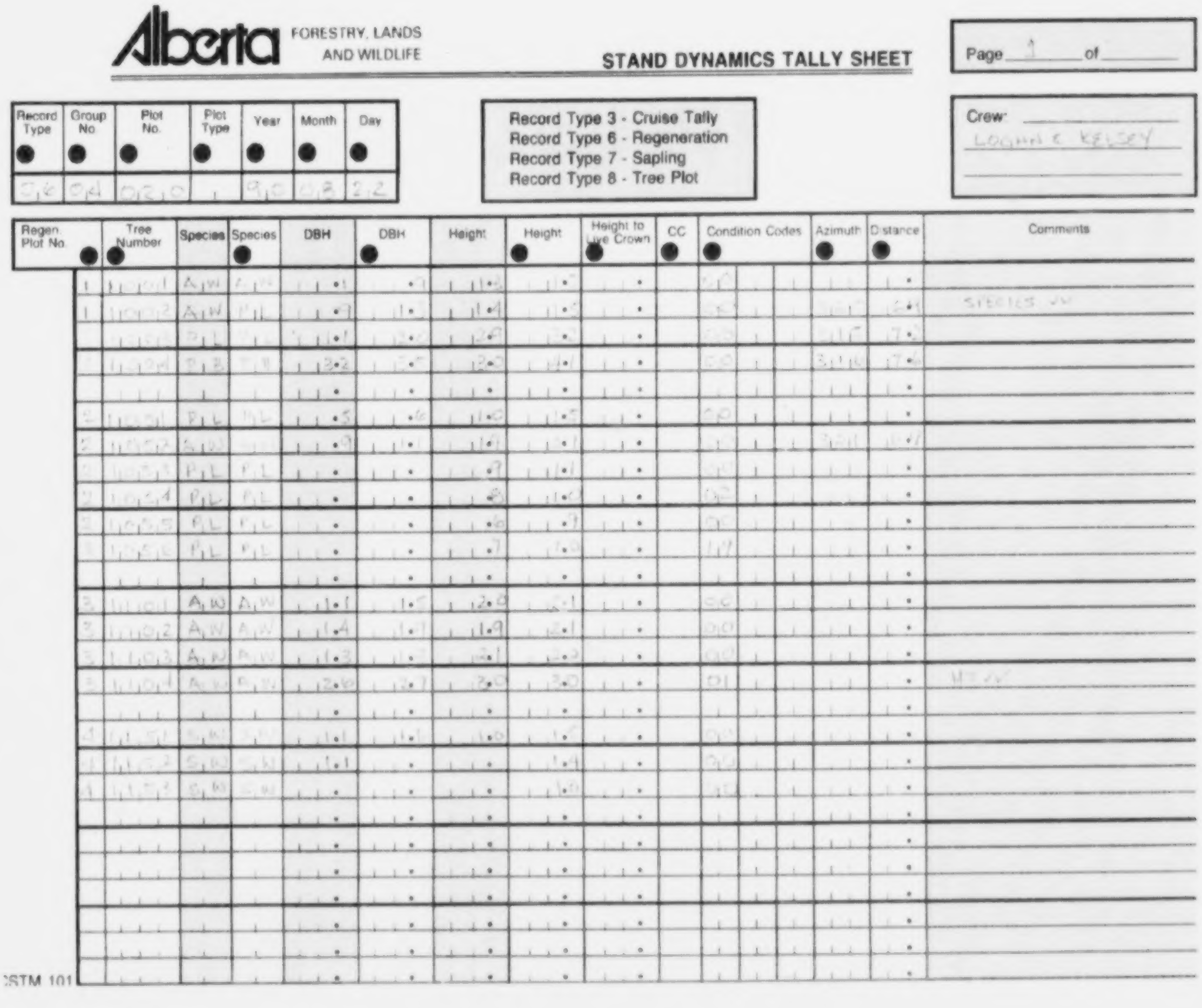

1
2
N
4
3
x 1002
x 1001
x 1003
x 1018
x 1019
x 1004
x 1017
x 1005
x 1016
x 1006
x 1015
x 1007
x 1014
x 1008
x 1013
x 1010
x 1012
x 1054
x 1053
x 1055
x 1051
x 1052
x 1056
x 1057
1157x
1158x
1156x
1159x
1155x
1151x
1154x
1152x
1153x
x 1101
x 1102
x 1104
x 1103

FIGURE 4.23 SEEDLING NUMBERING



Alberta FORESTRY, LANDS AND WILDLIFE

STAND DYNAMICS TALLY SHEET

Page 1 of ____

Crew: LOGAN & KELSEY

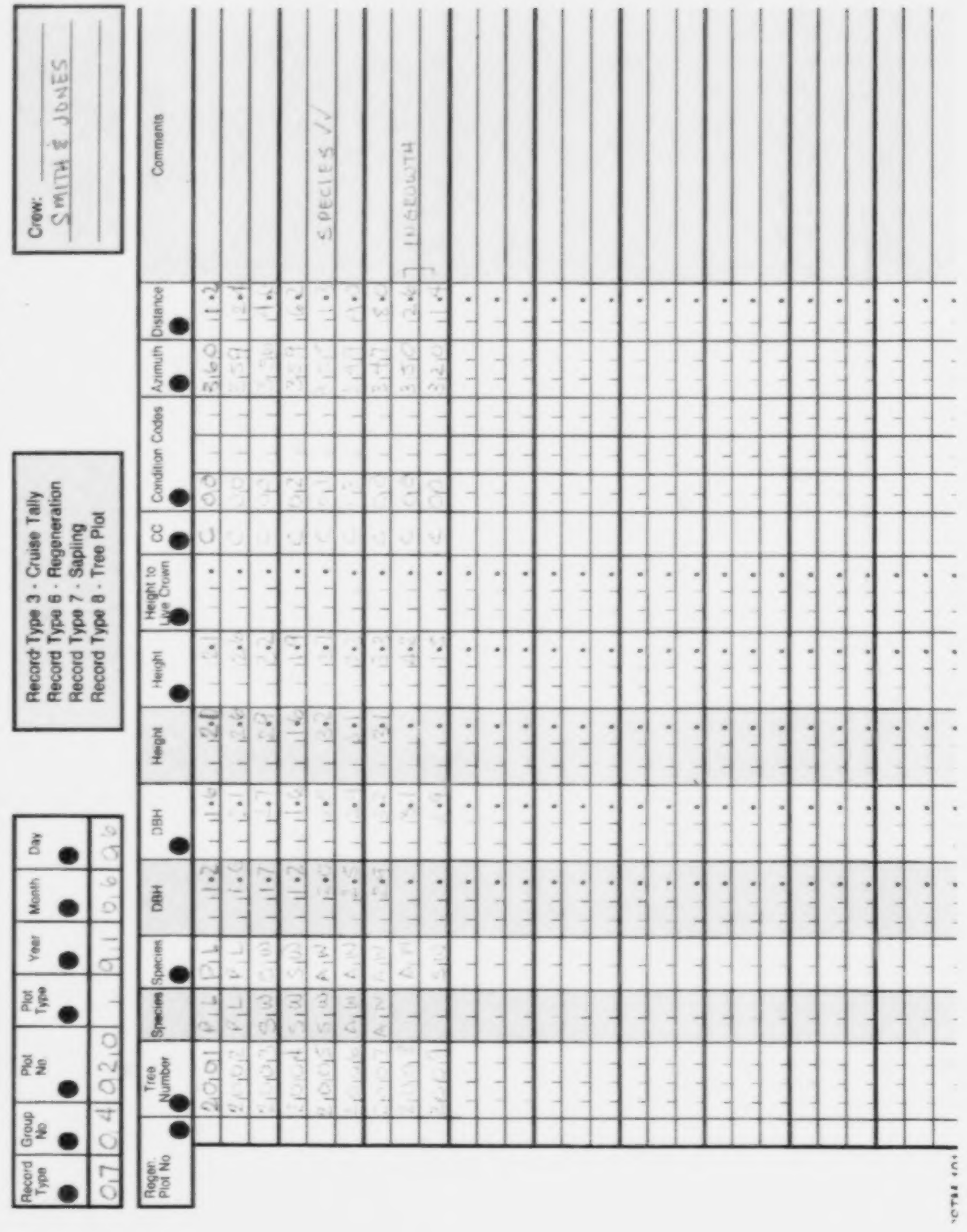
Record Type	Group No	Plot No.	Plot Type	Year	Month	Day
[illegible]6	04	020		90	08	22

Record Type 3 - Cruise Tally
Record Type 6 - Regeneration
Record Type 7 - Sapling
Record Type 8 - Tree Plot

Regen. Plot No.	Tree Number	Species	Species	DBH	DBH	Height	Height	Height to Live Crown	CC	Condition Codes			Azimuth	Distance	Comments
1	1001	AW	AW	.1	.9	1.6	.7			00					
1	1002	AW	PL	.9	1.[illegible]	1.4	.5			00			[illegible]	2.4	SPECIES [illegible]
	1003	PL	PL	1.1	2.[illegible]	2.9	.[illegible]			00			[illegible]	7.2	
[illegible]	1004	PB	[illegible]	3.2	3.5	2.0	4.1			00			3,1,[illegible]	7.6	
2	1051	PL	PL	.5	.6	1.0	1.5			00					
2	1052	AW	[illegible]	.9	1.1	1.6	.1			00			[illegible]	[illegible]	
2	1053	PL	PL			.9	1.1			00					
2	1054	PL	PL			.8	1.0			02					
2	1055	PL	PL			.6	.9			00					
2	1056	PL	PL			.7	1.0			[illegible]					
3	1101	AW	AW	1.1	1.5	2.0	2.1			00					
3	1102	AW	AW	1.4	1.1	1.9	2.1			00					
3	1103	AW	AW	1.3	1.[illegible]	2.1	2.2			00					
3	1104	AW	AW	2.6	2.7	3.0	3.0			01					[illegible]
4	1151	SW	SW	1.1	1.1	1.0	1.5			00					
4	1152	SW	SW	1.1			1.4			00					
4	1153	SW	SW				1.0			00					

CSTM 101

FIGURE 4.24 STAND DYNAMICS TALLY SHEET (CSTM 101) RECORD TYPE 6



Alberta FORESTRY, LANDS AND WILDLIFE

STAND DYNAMICS TALLY SHEET

Page 3 of

Record Type	Group No	Plot No	Plot Type	Year	Month	Day
07	04	020		91	06	26

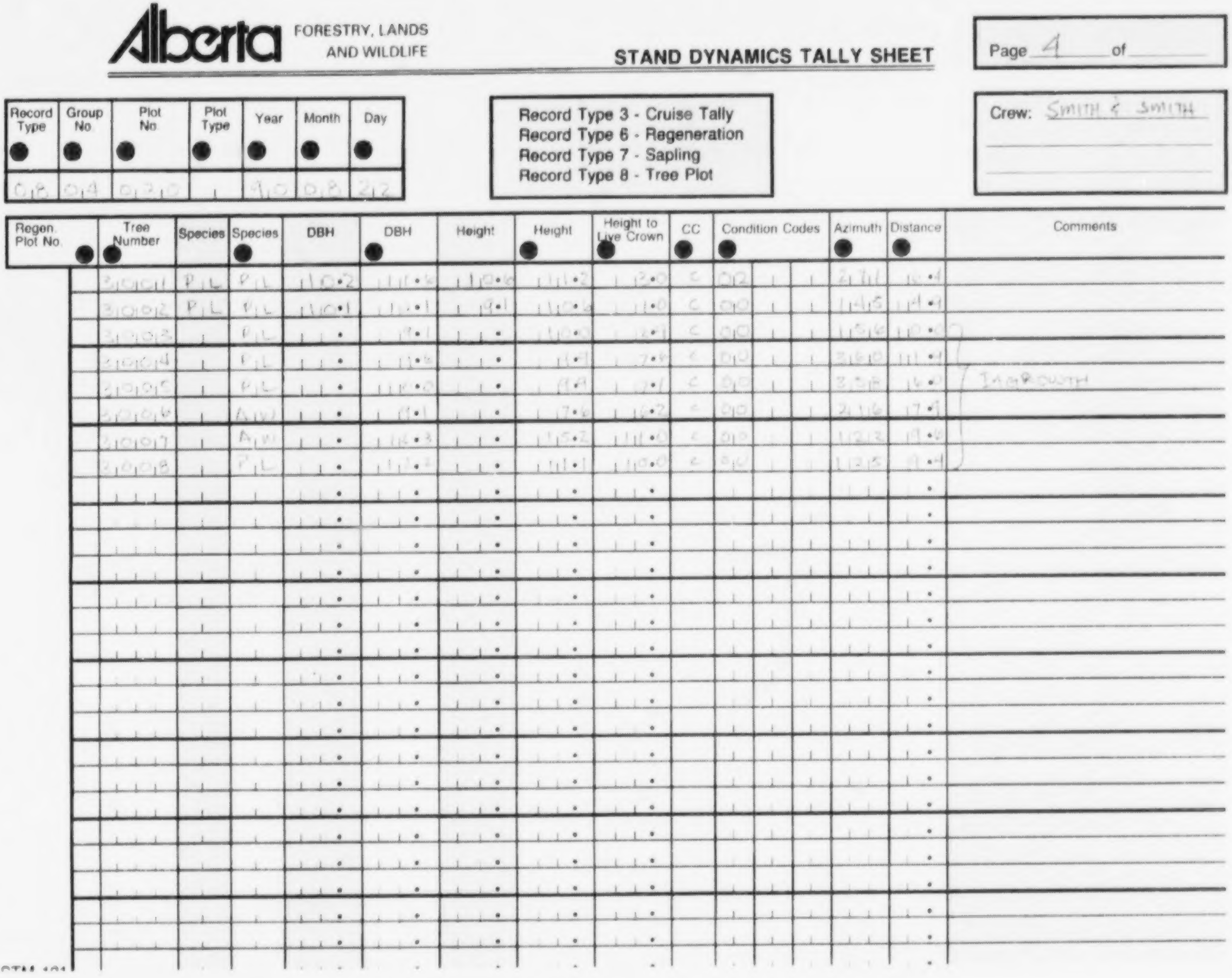
Record Type 3 - Cruise Tally
Record Type 6 - Regeneration
Record Type 7 - Sapling
Record Type 8 - Tree Plot

Crew: SMITH & JONES

Regen. Plot No	Tree Number	Species	Species	DBH	DBH	Height	Height	Height to Live Crown	CC	Condition Codes			Azimuth	Distance	Comments
	2001	PL	PL	1.2	1.6	2.0	2.1	.	C	00			360	1.2	
	2002	PL	PL	1.0	2.1	2.6	2.6	.	C	00			359	2.1	
	2003	SW	SW	1.7	1.7	2.8	2.2	.	C	00			356	1.6	
	2004	SW	SW	1.2	1.6	1.6	1.9	.	C	02			359	6.2	
	2005	SW	AW	[illegible]	[illegible]	3.2	3.1	.	C	01			[illegible]	1.[illegible]	SPECIES ✓✓
	2006	AW	AW	2.5	[illegible]	4.1	[illegible]	.	C	[illegible]			[illegible]	[illegible]	
	2007	AW	AW	[illegible]	[illegible]	3.1	3.2	.	C	[illegible]			347	8.6	
	2008		AW	.	5.1	.	4.2	.	C	03			350	2.6	INGROWTH
	2009		SW	.	.9	.	1.5	.	C	00			320	1.4	

CSTM 101

FIGURE 4.25 STAND DYNAMICS TALLY SHEET (CSTM 101) RECORD TYPE 7 (SAPLINGS)



Alberta FORESTRY, LANDS AND WILDLIFE

STAND DYNAMICS TALLY SHEET

Page 4 of

Crew: SMITH & SMITH

Record Type ●	Group No ●	Plot No ●	Plot Type ●	Year ●	Month ●	Day ●
08	04	020		90	08	22

Record Type 3 - Cruise Tally
Record Type 6 - Regeneration
Record Type 7 - Sapling
Record Type 8 - Tree Plot

Regen. Plot No. ●	Tree Number ●	Species	Species ●	DBH	DBH ●	Height	Height ●	Height to Live Crown ●	CC ●	Condition Codes ●			Azimuth ●	Distance ●	Comments
	3001	PL	PL	10.2	11.6	10.6	11.2	2.0	C	02			211	6.4	
	3002	PL	PL	10.1	1.1	9.1	10.6	1.0	C	00			145	4.8	
	3003		PL	.	9.1	.	10.0	2.1	C	00			156	10.0	INGROWTH
	3004		PL	.	1.6	.	1.8	7.4	C	00			260	11.8	
	3005		PL	.	11.0	.	8.8	2.1	C	00			358	6.0	
	3006		AW	.	8.1	.	7.6	6.2	C	00			216	7.8	
	3007		AW	.	16.3	.	15.2	11.0	C	00			123	9.6	
	3008		PL	.	11.2	.	11.1	10.0	C	00			125	9.4	
				.	.	.	.	.						.	
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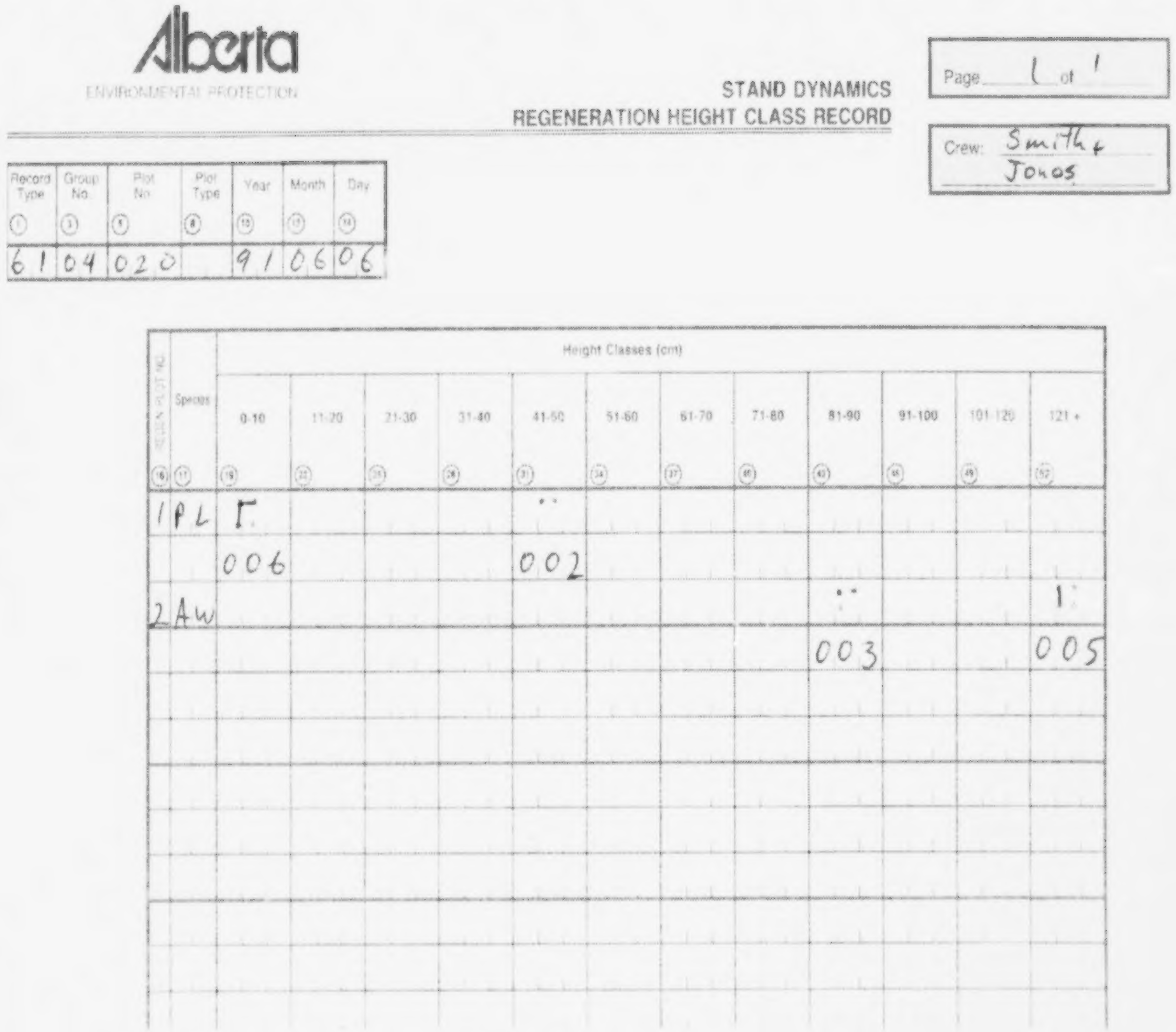
FIGURE 4.26 STAND DYNAMICS TALLY SHEET (CSTM 101) RECORD TYPE 8 (TREE PLOT)



Alberta
ENVIRONMENTAL PROTECTION

STAND DYNAMICS
REGENERATION HEIGHT CLASS RECORD

Page 1 of 1

Crew: Smith + Jones

Record Type ①	Group No. ③	Plot No. ⑤	Plot Type ⑧	Year ⑩	Month ⑫	Day ⑭
61	04	020		91	06	06

REGEN PLOT NO. ⑯	Species ⑰	Height Classes (cm) 0-10 ⑲	11-20 ㉒	21-30 ㉕	31-40 ㉘	41-50 ㉛	51-60 ㉞	61-70 ㊲	71-80 ㊵	81-90 ㊸	91-100 ㊻	101-120 ㊾	121 + (52)
1	PL	Γ.				··							
		006				002							
2	Aw									:·			1:
										003			005

FIGURE 4.27 STAND DYNAMICS REGENERATION HEIGHT CLASS RECORD (CSTM 100) RECORD TYPE 61

CSTM 102

Alberta FORESTRY, LANDS AND WILDLIFE

STAND DYNAMICS VEGETATION

Record Type	Group No.	Plot No.	Plot Type	Year	Month	Day
●	●	●	●	●	●	●
05	04	020		[illegible]	08	22

Crew: JACK JONES
SALLY SMITH

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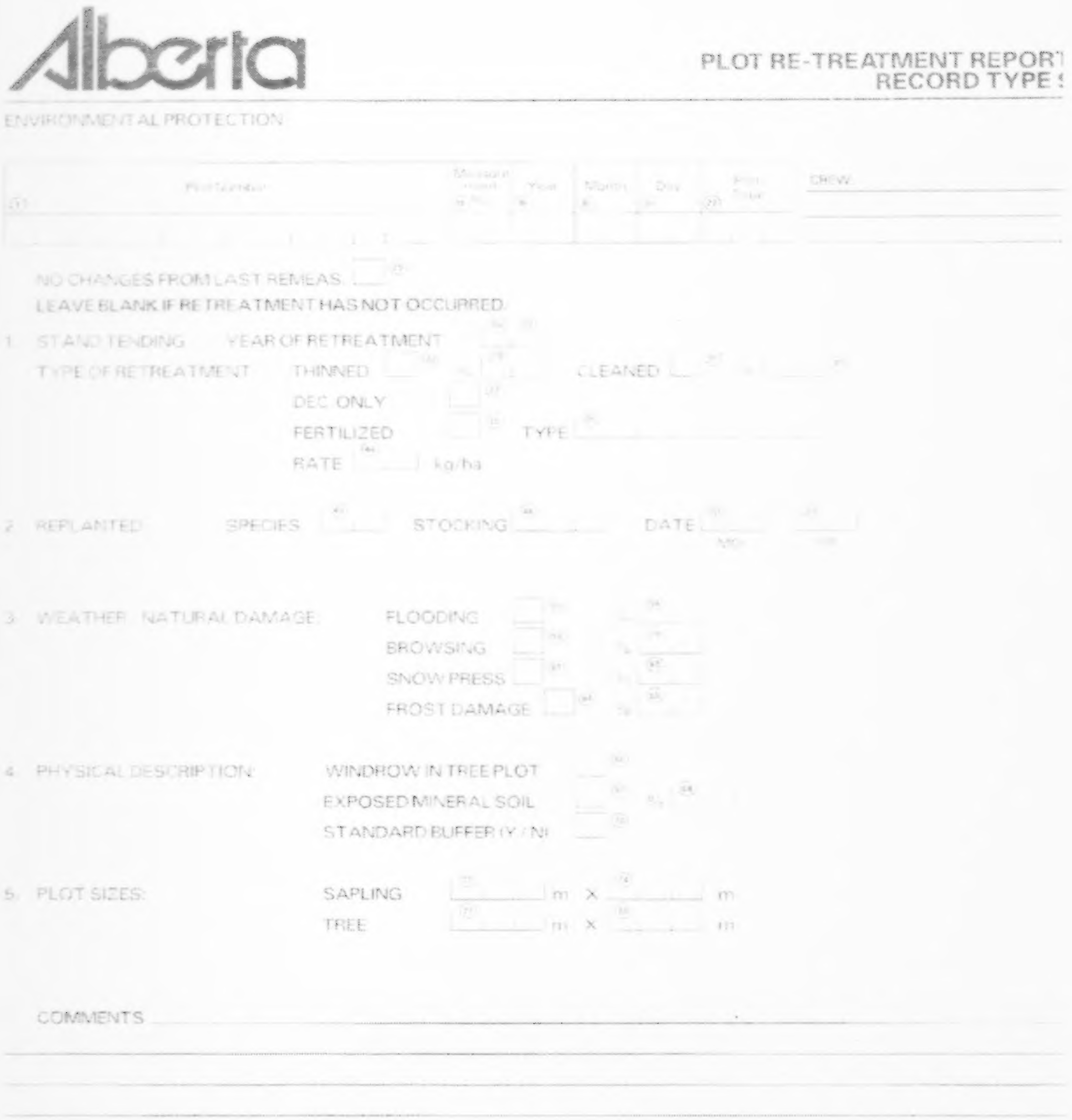
Parent Vegetation - R Type 4
Plot Vegetation - R Type 5

FIELD NAME ●	TREES % ●	TREES VIGOR	TALL SHRUBS % ●	TALL SHRUBS VIGOR	LOW SHRUBS % ●	LOW SHRUBS VIGOR	GROUND SHRUBS % ●	GROUND SHRUBS VIGOR	TOTAL SHRUBS % ●	TOTAL SHRUBS VIGOR	HERBS % ●	HERBS VIGOR	GRASS % ●	GRASS VIGOR	MOSS LICHEN % ●	MOSS LICHEN VIGOR	TOTAL ALL % ●	TOTAL ALL VIGOR
PINUCON	55	2																
POPUTRE			4	2														
[illegible]			[illegible]	2														
BETUPAP			0	2														
ALNUCRI			1	2														
SALIXSPP			0	2														
RIBELAC					0	2												
LEDUGRO					1	2												
LINNBOR							1	2										
VACCMYR							1	2										
VACCVIT							1	2										
MAIACAN											0	2						
EPILANG											4	2						
PYROSPP											0	2						
FRAGVIR											0	2						
ARALNUD											0	2						
DICRSPP															5	2		
PLEUSCH															2	2		
[illegible]															8	2		
CARESP													8	2				

① Record Type	Comments
C	BROWSING & GRAZING -
C	DISEASE > 20%
C	OTHER -

FIGURE 4.28 VEGETATION DESCRIPTION FORM



Alberta

PLOT RE-TREATMENT REPOR
RECORD TYPE

ENVIRONMENTAL PROTECTION

Plot Number	Measurement Number	Year	Month	Day	Plot Type	CREW

NO CHANGES FROM LAST REMEAS. ☐

LEAVE BLANK IF RETREATMENT HAS NOT OCCURRED.

1. STAND TENDING YEAR OF RETREATMENT ____

TYPE OF RETREATMENT THINNED ☐ % ____ CLEANED ☐ % ____

DEC. ONLY ☐

FERTILIZED ☐ TYPE ____

RATE ____ kg/ha

2. REPLANTED SPECIES ____ STOCKING ____ DATE ____ MO ____ YR

3. WEATHER - NATURAL DAMAGE: FLOODING ☐ % ____

BROWSING ☐ % ____

SNOW PRESS ☐ % ____

FROST DAMAGE ☐ % ____

4. PHYSICAL DESCRIPTION: WINDROW IN TREE PLOT ____

EXPOSED MINERAL SOIL ____ % ____

STANDARD BUFFER (Y / N) ____

5. PLOT SIZES: SAPLING ____ m X ____ m

TREE ____ m X ____ m

COMMENTS ____

FIGURE 4.29 PLOT RETREATMENT REPORT (RECORD TYPE 9)

Record Type	Grp.	Plot #	Plot Type		Year	Month	Day	Meas. #
6	4	3			95	05	01	

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Crew Gilday + Yusep

Regen. Plot #	Tree #	Sp.	Tree Type	Byear	HT1	Byear + Year	1983 HT	1984 HT	1985 HT	1986 HT	1987 HT	1988 HT	1989 HT	1990 HT	1991 HT	1992 HT	1993 HT	1994 HT	1995 HT	1996 HT
1	1001	PL	A	85	30	90								42	55	62	75	91	105	121
1	1006	PL	I	87	2	-							4	10	18	25	40	58	74	102
1	1010	SW	A	71	54	78	64	72	70	91	104	121	132	145	161	180	191	205	218	234
	CC																			
							1994 HT	1995 HT	1996 HT											
							252	286	295											
1	1015	AW	I	80									457							
																	1979 HT	1984 HT	1991 HT	1996HT
2	1051	PL	A	79	25	83		50	101	155	205	280	370	450	490	550	720	840	910	960
2	1056	PL	I	89	20	92														35
2	1062	PL	I	90	18	92														24
2	1074	PL	I	90	25	93												32	38	45
2	1082	PL	I	89	-	-														62
2	1091	PL	I	90	-	-														42
7	2095	PL	I	84	15	87						25	35	45	62	88	101	150	240	355
7	2110	PL	I	85	18	88							30	42	55	85	91	121	201	305
7	2004	PL	I	85	22	88					40	52	65	81	111	155	210	310	410	490
7	2010	PL	I	85																390

FIGURE 4.30 STAND DYNAMICS TREE AGE TALLY SHEET

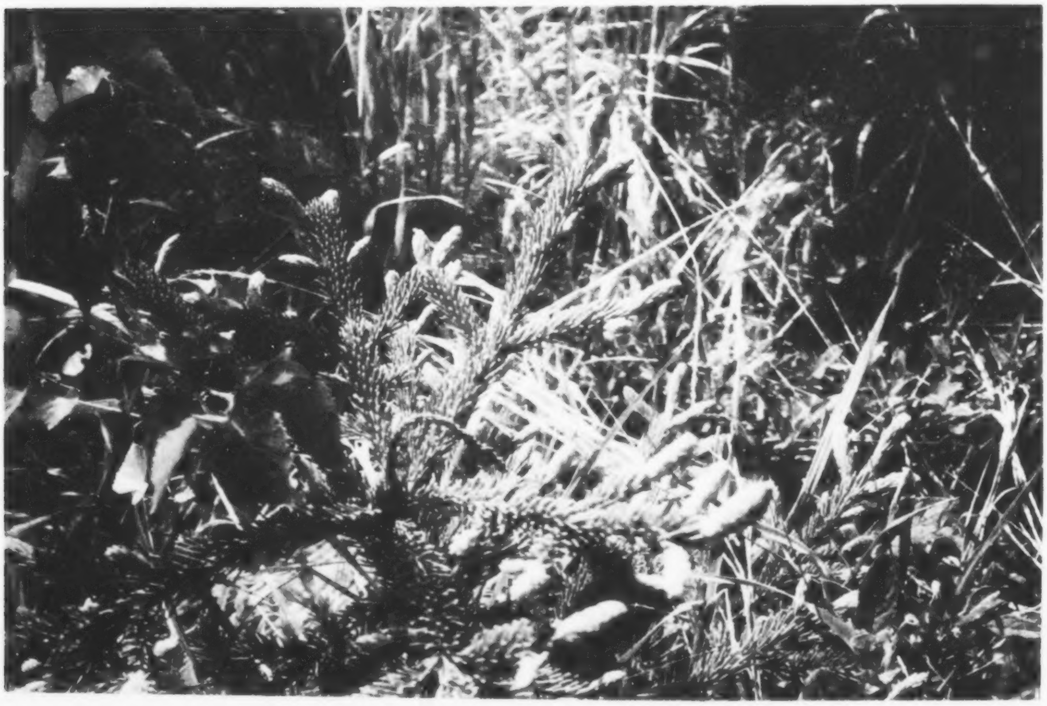

FIGURE 4.31 DIE BACK